



# THE JOURNAL OF THE MINISTRY OF AGRICULTURE

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## NOTES FOR THE MONTH.

During their recent stay in Italy their Majesties the King and Queen, accompanied by Their Majesties the King and Queen of Italy, visited the International Institute of Agriculture on 8th May. In reply to an address by M. Edoardo Pantano, Member of the Senate and President of the Institute, the King said:—

"I thank you, Monsieur le Président, on behalf of the Queen and myself for your eloquent Address, and you, Messieurs les Délégués, for the cordial reception which you have given us.

"The agricultural industry is of vital and universal importance, for it provides not only the actual necessities of life but a firm foundation of social and political stability, while ensuring to a thrifty and industrious population a life under the healthiest of natural conditions. Hence the welfare and prosperity of the agricultural community is a matter of deep concern to the Government and people of every country. I take a personal and active interest in the fortunes and misfortunes of the industry, not only in my own country and in the British Dominions, but throughout the world.

"I am fully aware that, in addition to the uncertainties at all times inherent in agriculture, the industry to-day has to combat special difficulties, owing to the severe fall in prices resulting from the great war upheaval. My sympathy goes out to my fellow agriculturists in their trials and anxieties; but I do not despair, believing that their traditional patience, courage and enterprise will again carry them triumphantly through this present crisis.

"After the ravages of war the way to peace and prosperity is uphill and devious, and perhaps the best and most direct path is to be found along the lines of international co-operation, so admirably followed during the past eighteen years by the International Institute of Agriculture. One of the main functions

of the Institute is to supply farmers in all countries with the latest information, practical as well as that based upon scientific research. Year by year the necessity for such an organisation is more generally recognised throughout the British Empire, and the adoption by the Governments and the agriculturists of these up-to-date methods augurs well for the industry's future. Doubtless the same spirit is manifesting itself in this beautiful land of Italy as elsewhere.

"In these and other directions the achievements of the International Institute of Agriculture must always be of special value, and the Queen and I are happy to have the opportunity of inspecting its work. I shall always watch with interest the progress of the Institute, confident that, favoured by the generous support which it has invariably received from His Majesty the King of Italy, and with the hearty co-operation of the adhering States, it will continue to render great services to the most essential and ancient of all industries."

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THE Ministry's annual report dealing with agricultural production in 1922 has now been published. The report differs

**Agricultural** from previous issues in that it includes  
**Production in 1922.** estimates of the production not only of the principal crops but also of early potatoes, onions and various other minor crops, as well as of other agricultural products such as meat, milk, butter, cheese, poultry, eggs and wool, the object being to include within the scope of one report all the information available in regard to the output from the agricultural land of the country.

The special features of the year as regards agricultural production are discussed in the report, and short statements are included with reference to the conditions under which the harvest was carried out and as to the quality of the grain crops. The forecasts of the probable yield of crops which were published by the Ministry in terms of actual yield for the first time last year are reviewed in relation to the final results.

An estimate has been made of the agricultural output in Great Britain, as represented by the value of the products sold off the farms for consumption. The estimated value is given separately for each of several main groups of commodities, and the total output from the farms of Great Britain in 1922 is put at about £260,000,000.

A new and interesting feature of the report is the consideration of the results obtained by the classification of a limited

number of holdings with a view to seeing what are their average characteristics. The types of holdings so classified are sheep farms, (arable, pasture and mountain), poultry farms, fruit farms, milk producing farms and mixed farms of about 30 acres, 150 acres and 300 acres in extent, respectively.

The report, which forms Part II of the Agricultural Statistics, 1922, is published by H.M. Stationery Office, and may be purchased through any bookseller, price 1s.

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### Rural Industries.

MUCH has been written since the end of the Great War as to the place of rural industries in the national life. Until comparatively recently, however, there was sadly lacking a really practical attempt to come to grips with the many problems the subject presented, to assist those who were obviously interested but, at a loss as to procedure, in directing production and organising sales, to bring about co-operation among the workers in rural industries, and to show where and how definite progress could be made. The organisation of the Rural Industries Intelligence Bureau, however, seems likely to change the position, and to give new inspiration to certain phases of country life and the industries dependent thereon. An attempt is now being made to deal with the question methodically, and in this connection it is proposed to cover the subject generally in a series of articles commencing in this issue of the *Journal*. The fullest support of readers is invited on behalf of the Rural Industries Intelligence Bureau, both by assisting it by every means in their power and by calling upon it for advice.

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### Seeds for Grassland.

In the May issue of this *Journal* there appeared an article, from the pen of Professor Stapledon, of Aberystwyth, on "Seed Mixtures for Grassland." The title, as will no doubt have occurred to many readers, might appropriately have been amplified by prefixing the adjective "simple." In the present issue will be found a contribution from Professor Percival, of Reading, in whom, at any rate for permanent pastures, the more complex mixture finds an advocate. Grassland and its many and varied problems are now receiving the special attention that is their due, and for this reason expressions of opinion from those who are in practical touch with any aspect of so wide a question should be read with more than ordinary interest. In scarcely any department of British farming is it

possible to lay down absolute and certain rules of general application, and, as Professor Stapledon pointed out; it is the farmer himself, rather than the scientist, who must constitute the final court of appeal as to what is the best method to adopt on his own land. In the very nature of things, however, the process cannot be otherwise than slow, consisting as it does in proving, not perhaps all things, but certainly a great many things, and then cleaving, though still with a very open mind, to that which has shown itself to be good.

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THE Ministry desires to draw attention to the fact that the provision contained in the Importation of Animals Act, 1922,

**Importation of  
Cattle.**

for the importation of Canadian store cattle applies to store cattle only as defined in the Act, viz., "Canadian castrated male or spayed female bovine animals which are intended for feeding purposes and not for immediate slaughter." It is not the intention of the Ministry to allow fat cattle ready for immediate slaughter to be treated as stores and allowed to pass through the Landing Places to inland markets and slaughterhouses. Such cattle (*i.e.*, fat cattle) will be removed to the category of animals for slaughter at the port of landing and licences for their removal alive from the Landing Places will not be granted.

The attention of shippers is also called to the requirement contained in Section 6 of the Act of 1922 imposing a fee to be fixed by the Treasury to cover the cost of the veterinary examination of imported animals. This fee has been fixed by the Treasury at 6d. per head in the case of cattle, and 1d. per head for pigs, sheep and goats. This fee will apply to all such animals imported on and after 1st April, 1923, whether from Canada, the United States, Ireland, the Channel Islands, the Isle of Man or from any other country from which for the time being imported animals are allowed to be brought to Great Britain. It must be paid to the Landing Place Authorities (*i.e.*, the owner or occupier of the Landing Place) who will act as the agent of the Ministry for the collection of the fees.

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THE issue of official leaflets on agricultural subjects dates from the days of the Agricultural Department of the Privy Council, and the Board of Agriculture, which was established in 1889, extended the practice and gave the leaflets a more practical and educational nature. By 1904 one hundred leaflets

**The Ministry's  
Leaflets.**

had been published, and in the same year these were collected and published in one volume.

The circulation of leaflets, however, was not large, and even as late as 1910 the annual distribution was only 54,000. From that date the circulation rose rapidly, and in 1912 a million and a half leaflets went out from the Board's offices. Even then a critic is said to have sarcastically remarked that although the Board "flooded the country with leaflets, no farmer had ever heard of them."

A more moderate estimate of the position was made by a Worthing grower who wrote "I have made the acquaintance of many hundred farmers, fruit growers and market gardeners, and I can safely say that not more than 2 per cent. are aware that the Board distributes leaflets containing useful information and advice. To them the *Journal* is an unknown quantity. It seems regrettable that so much excellent and valuable information should be stored up in Whitehall Place when there are many thousands of men who urgently require it, and would eagerly read it did they know how easily it was to be obtained."

It is hardly possible to accept this statement in view of the large number of leaflets issued and of the efforts of Local Authorities, Agricultural Societies and other bodies to draw the attention of farmers to them. Nevertheless, it is true to say that while many farmers had at one time or another read one or other of the leaflets, there remained a considerable number who were disinclined to acquire knowledge by this particular means.

By July, 1913, however, 281 leaflets were in existence and 2 bound volumes of leaflets had been published. The volume containing Leaflets Nos. 1-100 had reached its 11th edition, and that containing Leaflets Nos. 101-200 its 4th edition.

On the outbreak of war an increase in the supplies of home-grown food became of the first importance. The ranks of the skilled farmers were increased by the addition of large numbers of food-producers whose enthusiasm was not always accompanied by a corresponding degree of knowledge, while even farmers of experience required and were ready to accept advice in the new conditions. To meet these needs it was decided to bring out a new series of special leaflets, and by May, 1915, 30 of these had been issued, and nearly 1½ million copies distributed. The leaflets of this series were intended mostly for the amateur, and dealt mainly with Poultry, Pigs, Allotments, Feeding, and the Preservation of Fruit and Eggs.

but certain of them contained information on corn growing and other subjects of primary interest to the farmer. Eventually 104 of these leaflets were issued. In 1917 the Food Production Series was started and of these 61 were issued. This series was intended both for the professional and for the amateur food producer, and was in great demand.

Altogether, during the four war years nearly ten million leaflets were distributed, together with about 86,000 bound volumes of leaflets—the third volume of which appeared in 1915.

After the War the Ministry's publications continued to be in wide request, though the special series were gradually withdrawn or combined with the ordinary issues. To meet the need for economy, the free distribution has been largely restricted, only one or two copies now being supplied to the same applicant without charge. This radical change has decreased the demand for leaflets, but it may well have increased the appreciation of them. During the six months from October 1922, to March, 1923, 5,900 applications for leaflets were received by the Ministry. In response 24,289 leaflets were distributed free and 52,648 were sold.

The issue of the leaflets in volumes containing them in numerical sequence has also been discontinued owing to the very high prices which it would have been necessary to charge in order to cover the cost. Popular as they had been these volumes also had obvious disadvantages. The grouping of leaflets by consecutive numbers instead of by subjects made both reference to and revision of the volumes very difficult. Smaller volumes of leaflets grouped according to subjects have been substituted for them, and the increasing sales suggest that the public appreciate the change.

Exclusive of the War series, nearly 400 leaflets have now been issued, and of these 138 are included in the eight Sectional Volumes so far issued.

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According to the returns issued by the Ministry of Transport, the number of 5s. road licences issued in Great Britain in respect

**Agricultural  
Tractors in  
Great Britain.**

of locomotive ploughing engines, agricultural tractors, motor ploughs and other agricultural engines was 17,293 in 1922 as compared with 18,179 in 1921, a reduction of approximately 5 per cent. In order to arrive at the number of agricultural tractors actually in use, additions must be made

for tractors used for road haulage and bearing a £6 licence, and for those used for stationary work and field work, but not making use of public highways and not therefore paying licence duty. A deduction must on the other hand be made for ploughing and other engines. Without an actual census of agricultural tractors in use, opinions must differ as to the net addition to be made to the Ministry of Transport's figures, but 25 per cent. would probably be excessive. It is fairly safe, however, to estimate that the total number of tractors and motor ploughs in use in Great Britain at present is not much more than 20,000. Assuming the average life of a tractor to be from four to five years, the annual demand for replacing existing tractors should be between 4,000 and 5,000.

There seems no doubt (as was indicated by the reports from the Ministry's Crop Reporters summarised in the "Agricultural Market Report" for 16th February, 1923) that during the last two years there has been an actual, although small, decrease in the number of tractors in use, but the decrease shown in the number of licences issued is possibly larger than the actual decrease. Farmers may still be employing tractors in respect of which they have not thought it worth while to renew the licences.

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The Ministry publishes an annual report on the occurrence of fungus diseases of crops in England and Wales, but owing to

**Report on  
Fungus Diseases  
of Crops, 1920-21.**

the transfer of plant disease work from Kew to the new Pathological Laboratory at Harpenden, the report for 1920 was delayed and has been issued jointly with that for 1921. As the summer of 1920 was cold and wet, while that of 1921 was unusually warm and dry, an exceptional opportunity was afforded for comparing the effect of climate upon plant diseases. An endeavour has been made in the report to show the effect of the two seasons, and weather charts are included which enable this to be studied.

The report takes each crop in turn and gives an account of the extent to which it suffered during the two years from each disease to which it is subject. Notes are added on measures of control, legislation, and recent research in connection with the diseases. In all, 391 diseases are dealt with, forming a complete list of fungus diseases so far known to occur in England and Wales. Of these no fewer than 136 have been added since the publication of the report for 1919.



This report should be of great value to students and writers on the subject, and to all agricultural and botanical departments in colleges and research institutes, while progressive market gardeners and fruit growers will also find it useful not only as a work of reference, but also for the practical advice it contains on the growing of crops. The report can be obtained from the office of the Ministry, price 3s. net, post free.

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OWING mainly to the reduction in the price of milk, the general index number of the prices of agricultural produce showed a further fall in April. On the whole agricultural produce sold at 54 per cent. above pre-war prices, against 59 per cent. above in March, 1923, and 70 per cent. above in April of last year.

The following table shows the percentage increase in each month since January, 1920 :—

PERCENTAGE INCREASE COMPARED WITH THE AVERAGE OF THE CORRESPONDING MONTH IN 1911-13.

MONTH.	1920.	1921.	1922.	1923.
January ... ..	200	183	75	68
February ... ..	195	167	79	63
March ... ..	189	150	77	59
April ... ..	202	149	70	54
May ... ..	180	119	71	—
June ... ..	175	112	68	—
July ... ..	186	112	72	—
August ... ..	193	131	67	—
September ... ..	202	116	57	—
October ... ..	194	86	59	—
November ... ..	193	79	62	—
December ... ..	184	76	59	—

Wheat and oats rose in price during April, wheat averaging 9s. 11d. per cwt. against 9s. 5d. per cwt. in March, while oats at an average of 9s. 10d. per cwt. were 2d. per cwt. dearer. Barley, however, declined by 1d. per cwt. on the month, but as the fall at this time of the year is usually sharper the index number rose by 3 points. The very large supplies of potatoes caused a further reduction of about 4s. per ton, and brought prices in town markets to 28 per cent. below those of April, 1911-13. Hay remained very steady, average prices being only 6d. per ton lower than in March.

Prices of fat cattle hardened, but the average over the month was the same as in March. As, however, there is usually some increase in April, the index number shows a fall of 3 points.

Fat sheep sold at exactly double the pre-war price, but fat pigs declined to 71 per cent. above 1911-13. The fall in the prices of fat pigs which had gone on steadily from the beginning of the year was checked in the second half of April. Except for the best cattle, dairy cows have been in poor request and prices declined still further, but store cattle, although showing a fall in the index number, were dearer than in March, the rise being relatively smaller than was usual before the war. Store sheep remained at 92 per cent. above the level of 1911-13, but store pigs though still very dear declined somewhat.

The summer prices of milk are not proportionately so much above pre-war prices as those ruling during the past winter, and the average contract prices of milk delivered to large towns during April were about 70 per cent. above the pre-war summer contract prices against 90 per cent. above in the winter. Butter declined by 2d. per lb. as compared with March prices, and cheese, owing to the lower prices ruling for new season's cheese, also showed a decline. All classes of dairy produce were, however, appreciably dearer than in April, 1922. Eggs on the other hand were much cheaper than a year earlier, the average price in April being 12½d. per dozen or only 37 per cent. above the pre-war price.

The following table shows the average increases during recent months in the prices of the principal commodities:—

PERCENTAGE INCREASE AS COMPARED WITH THE AVERAGE PRICES RULING IN THE CORRESPONDING MONTHS OF 1911-13.

Commodity.	1922.		1923.			
	Apr.	Dec.	Jan.	Feb.	Mar.	Apr.
Wheat ...	57	32	33	28	27	31
Barley ...	49	17	20	12	8	11
Oats ...	49	36	43	39	36	36
Fat cattle ...	65	48	61	61	54	51
Fat sheep ...	128	81	103	97	94	100
Fat pigs ..	90	94	102	88	77	71
Dairy cows ...	47	72	74	67	58	55
Store cattle ...	34	28	36	36	31	29
Store sheep ...	78	83	105	100	92	92
Store pigs ...	95	151	171	154	136	131
Eggs...	89	63	86	46	55	37
Poultry ...	83	86	81	80	81	75
Milk ...	42	90	90	90	87	70
Butter ...	49	73	73	72	70	68
Cheese ...	46	60	85	88	95	92
Potatoes ...	95	7	—1*	—5*	—12*	—28*
Hay ...	28	47	43	42	42	40

\* Decrease.

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THE agreement of the Cheshire Committee providing for the payment of adult male workers at the rate of 32s. for a guaranteed week of 54 hours, with overtime at 9d. per hour and proportionate rates for male workers under 21 years of age, has been extended until 31st October, 1923.

**Conciliation  
Committees in  
Agriculture.**

The Committee for Shropshire has reached an agreement to run until 27th October for the payment of adult male workers at the rate of 30s. for a guaranteed week of 53 hours, with the same rate for weekday overtime, and 9d. per hour for all work on Sundays. The Shropshire agreement also provides that the Saturday half-holiday should be observed whenever possible, and that during harvest, unless mutual agreements for lump sums are arranged, work in excess of 53 hours per week should be paid for at the rate of 10d. per hour.

At a recent meeting of the Cumberland and Westmorland Committee it was decided that the rates of 37s. for adult skilled workers for customary hours (68 hours per week) and of 30s. for a week of 54 hours in summer and 48 hours in winter for other male workers should be maintained for the hiring period extending to 11th November. The agreement specifies proportionate rates for skilled workers between 16 and 21 years of age, and for a rate of 5d. per hour for female workers of 16 years and over. The North Northumberland Committee has reached an agreement to apply from 12th May, 1923, to 11th May, 1924, providing for payment of adult male workers at the rate of 32s. for a week of 52½ hours in summer, and a shorter working week (to be decided by mutual agreement) in winter, overtime being payable at the rate of 10d. per hour on weekdays and 1s. per hour on Sundays. The agreement also provides for proportionate rates for workers under 21 years of age and for special rates for female workers.

The Lancashire Committee has made a further agreement to operate until 31st October, 1923. The rates for the Eastern area of the county, *i.e.*, 40s. per week applicable to teamsmen and stockmen for the usual working hours, remain unchanged. For the Northern area, where the rate for skilled workers is 37s. 6d. per week, there is similarly no change, but the rate will be 35s. in the case of ordinary workers in this area. For the Southern area the rates agreed are 35s. for skilled workers and 32s. 6d. for ordinary workers.

The provisional agreement of the Committee for the Southern area of West Sussex for a rate of 27s. for 54 hours for adult workers has been ratified.

An agreement has been reached by the Suffolk Conciliation Committee providing that from 26th April until one month after notice of termination is given by either side (such notice not to be given prior to 30th September, 1923), able-bodied adult male workers shall receive payment at the rate of 25s. for a guaranteed week of 50 hours, with overtime at 6d. per hour up to 54 hours, and at 7½d. per hour for all subsequent employment. Horsemen and stockmen will receive an additional 5s. per week for their extra customary hours. The wages of male workers under 21 years of age will be at proportionate rates. The Suffolk agreement also contains a clause to the effect that employers shall provide facilities for a working day of not more than 6½ hours on Saturdays, the workers' side of the Committee undertaking that workers shall be available in cases of special necessity (provided that overtime rates be paid).

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THE annual agricultural returns will be collected again this year on 4th June. The forms were issued at the end of May to all occupiers of agricultural holdings, and the returns should be made and forwarded without delay to the Crop Reporter, whose address appears on the back of the form.

**Annual Returns  
of Crops and  
Live Stock.**

These returns afford the only real measure of the dimensions of the agricultural industry, and of the changes in cultivation and the number of live stock from year to year. Tabulated results are the more valuable the earlier they can be published, and all occupiers of agricultural land are urged to complete their returns at the proper date. The returns of individual occupiers will be treated as confidential, and will be used only for the compilation of statistics of economic value to agriculture.

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## SEED MIXTURES FOR PERMANENT GRASSLAND.

PROFESSOR J. PERCIVAL, Sc.D.,  
*University College, Reading.*

THE fairly constant recurrence of temporary leys in the ordinary agricultural rotations has given opportunity to the farmer to become practically acquainted with the best mixtures of seeds for the production of such leys. He is aware that the plants used must give good yields of forage or hay, and as the charge for seed is a recurrent one it must be kept comparatively low.

Mixtures of one or two clovers (red, alsike and white) with the rye-grasses. Timothy and cocksfoot, satisfy practically all the conditions essential for success with leys of short duration.

The laying down of arable land to permanent grass is, however, a much more complicated problem, and success or failure can only be determined after a considerable period. The results of sowing a particular mixture may appear satisfactory for the first three or four years, but only the later history of the pasture or meadow can reveal any errors which have been made.

The most obvious and direct method of converting arable land into good permanent grass is to "turf" it with the "sole" removed from a first-class pasture, but little is to be gained by destroying one field to make another. In a modified form this was the essence of the so-called "inoculation" method recommended long ago for changing cultivated fields to good grass. Narrow strips of turf ploughed from a fine pasture were cut into pieces six or eight inches square, and these were planted out on clean well prepared soil at intervals of two or three feet. It was assumed that the unoccupied ground would soon be covered by the spreading roots, creeping stems and seeds of the plants composing the turves laid down. Such a process, however, has many practical disadvantages and need not be discussed further.

The other chief methods which have been widely applied for the production of permanent grass on arable soils are :—(1) "Tumble-down"; (2) the sowing of "hay seeds"; and (3) the sowing of mixtures of commercial grass and clover seeds.

(1) **Tumble-down Pastures.**—In times of adversity when arable farming has fallen upon evil days the temptation to

allow cultivated land to become covered as best it might by diversified herbage derived from seeds present in the soil or carried to it by the wind or other means has been almost irresistible. In the majority of such cases the ground has been allowed to "tumble down" after a temporary grass and clover ley, rather than after a cereal or root crop, in the hope that the plants of the ley would produce abundant seed from which subsequent crops might be expected.

Probably the greater part of the poorest grassland throughout the country which shows the old plough ridge and furrow is the result of this practice, and it is needless to emphasise the futility of such a method as a means of establishing a good permanent pasture or meadow.

(2) **The Sowing of "Hay Seeds."**—The sowing of "hay seeds" taken from barns and the bottom of haystacks, or the use of the miscellaneous seeds obtained from a crop of hay taken from a good meadow gives results little better than "tumble down." Instead of producing a replica of the herbage of the fine grassland from which it has been harvested, such practice leads to uniform disappointment.

The result is readily explained, for examination of such "hay seeds" has invariably shown that the mixture consists of only the few kinds of plants which ripen at the time the crop is cut, most of the best early and late grasses and clovers upon which the high value of the grassland depends being absent.

(3) **The Use of Seeds Mixtures.**—The sowing of mixtures of commercial grass and clover seeds is the only practical means of converting arable land to permanent grass, and experience has shown that there is little difficulty in producing good permanent pasture or meadow on arable land upon practically all classes of soil except those of an exceptionally dry character.

To accomplish this, however, it is absolutely essential that certain conditions must be fulfilled. The kind of seeds sown, and the relative amount of each must be carefully planned, and full regard must be paid to the preparation of the land and the time of sowing. Inattention to any of these points will lead to unsatisfactory and even disastrous results, and examples of failure on account of neglect of one or other of these conditions are very common.

Of foremost importance are (1) the species or kind of seeds used, and (2) the relative amount of each in the mixture which is sown.

It is quite useless to expect to produce good permanent pasture by sowing only the seeds of rye-grass and red clover, for most of the plants die out in a year or two and the land sown soon becomes comparatively bare and rapidly overrun by weeds.

The kinds of clovers and grasses adapted for the laying down of permanent grassland are familiar to all seedsmen and others concerned with the preparation of prescriptions for this purpose, and except that unnecessary and more or less useless plants such as sweet vernal grass, yarrow, sheep's parsley, and burnet are sometimes recommended for inclusion in mixtures, there is general agreement in regard to the kinds of grasses and clovers to be sown.

In regard, however, to the relative amount of each to be employed there is difference of opinion and practice, and it is in the disregard of the proper balance between the amounts of the different seeds used in the mixture that nearly all the failures to obtain a good permanent turf of high quality are due. The best permanent grassland of this country which gives palatable and nutritious forage and hay from early spring through summer to late autumn in practically all seasons, consists of a complex collection of plants, and the necessity of the use of many rather than a few species of seeds needs but little discussion.

There is no single clover and grass, or even simple mixture of a few kinds of seeds (such as rye-grass, Timothy, and one or two clovers), which will do more than produce a temporary ley.

The results in the first year or two may be made extraordinarily attractive by excessive seeding of these species, but permanence and the establishment of a good sole of turf are not to be obtained by such means, and recommendations to limit the number of kinds of seeds sown to those suggested are, in the writer's opinion, advocating a national disservice.

*Advantages of a Complex Mixture.*—The advantages of the complex over the simple mixture are patent. The ground is more densely covered and the different depths of the soil more completely utilised when a variety of plants with different habits of growth are sown than is the case when few are used.

Moreover, a well selected complex mixture in which early, mid-season and late-growing plants are employed yields a crop over a longer period of the year than can be expected from a few kinds only.

In addition, whereas in some seasons all the components of a simple mixture may practically fail, it is unlikely that all the different species of a complex mixture will succumb at the same time, and the chance of a crop is therefore greater whatever the climatic or soil conditions may be.

By far the majority of prescriptions recommended to farmers have hitherto had in them much too high a proportion of rye-grass and red clover, and too low a proportion of permanent plants: these are in reality short-ley mixtures, and although the yield during the first year or two is high, in subsequent years the land becomes comparatively bare, the permanent grasses having been largely smothered or destroyed by the heavy crops of the short-lived plants.

Disastrous results are also not infrequent through sowing too high a proportion of cocksfoot; especially is this the case on the lighter soils where this deep-rooting plant establishes itself much more rapidly than the finer grasses, which it smothers and becomes at the same time coarse and dry, and unpalatable to stock.

The amount of perennial rye-grass should rarely exceed one-quarter and the cocksfoot rarely exceed one-eighth of the total amount of seed sown.

*Some Useful Mixtures for Permanent Grass.*—The prescriptions given below are especially suited to the production of permanent pasture on the soils indicated; they will be found to give a good yield from the first with little or no diminution

#### MIXTURES OF SEEDS FOR PERMANENT GRASSLAND.

	<i>Light Medium Heavy</i> <i>Soils. Soils. Soils.</i>		
	lb.	lb.	lb.
Perennial Red Clover (Single Cut Cow-Grass) ...	2	2	1½
Alfalfa Clover ... ..	—	2	2½
White Clover ... ..	2½	2	2
Wild White Clover ... ..	½	½	½
Kidney Vetch ... ..	2	—	—
Perennial Rye-grass ... ..	7	4	3
Timothy ... ..	—	2	3
Cocksfoot ... ..	3	2	2
Meadow Fescue ... ..	1½	3	3
Meadow Foxtail ... ..	—	1½	2½
Rough-stalked Meadow-grass ... ..	—	½	¾
Smooth-stalked " ... ..	1½	1	¾
Crested Dogtail ... ..	1	1	1
Hard Fescue or Red Fescue ... ..	2	1½	1½
lb. per acre ...	23	23	24



in the later years where the land receives proper attention annually.

With the exception of the red and alsike clovers which usually die out in the first four or five years, all the plants are permanent, and they cover the ground adequately, when sown in the proportions given on clean land in good condition.

From observation extending over more than twenty years, the writer has found that none of the plants mentioned die out when sown on the soil indicated, although meadow fescue, on account of its erratic production of inflorescences, is in some seasons judged to be absent when the pastures are examined in June.

The amounts of seed indicated to be sown per acre have been found sufficient where the suggestions for the preparation of the land, and time of sowing referred to below, have been observed.

Under less favorable conditions the sowing of 27 or 28 lb. per acre of the same mixture instead of 22 or 23 lb. is advisable.

Golden oat grass ( $\frac{1}{2}$  lb. per acre) may be profitably added to the mixtures on light and medium soils.

*Preparation of the Land.*—Many of the best grasses are small plants when young, and liable to be crowded out or checked in their growth by weeds. It is therefore essential that the land should be as clean as possible before sowing, and in good condition; an application of about 2 cwt. of superphosphate per acre has been found beneficial.

Before sowing, the soil should be well cultivated, a fine seed bed prepared by harrowing, and the surface rolled. To sow on ground left in a rough state or prepared as for a cereal crop is fatal to good results; much of the seed is buried and lost, and plots badly prepared in this respect have been found at Reading to give very inferior results in comparison with those which were finely harrowed and rolled.

*Method of Sowing.*—As it is practically impossible to sow a definite amount of seed uniformly over a given area exactly, and have no seed left, it is advisable to divide the seed into two portions and go over the field twice, the separate sowings to be made at right angles to each other. The sowing is best done in the early morning when there is no wind. After sowing the surface should be very lightly harrowed.

*Time of Sowing.*—There are two periods at which sowing may be carried out, viz., (1) spring, and (2) autumn.

When seeds are sown in spring it is usual to sow them on a cereal crop, in which case the amount of seed used for the cereal should be at least half a bushel less than that ordinarily sown, or the grass may be injured by smothering.

The best time for sowing is the latter half of March : earlier than this germination is checked somewhat by low temperature ; if sown later the young plants are liable to be poorly developed by May and June, when there is danger of loss by drought.

Sowing in autumn without a crop gives excellent results where the land can be properly prepared. The best time is the latter half of August : earlier is liable to be too dry, later is not advisable, as the young plants have not time to become established before frosts arrive.

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## THE AGRICULTURAL WORKER.

JOHN STRONG, C.B.E., M.A., LL.D.,

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**Necessity of Vigorous Country Life.**—It is easy to understand that, from a national point of view, a vigorous and healthy country life is of the highest importance. In the past when this has failed national decline has followed. It would seem that successful urban life, apart altogether from the question of food supply, which at times, as for example during war, assumes a magnitude of the first dimensions, is dependent upon the existence of a flourishing rural life. One has only to try and imagine a country entirely denuded of its agricultural population to appreciate this fact. From the point of view of national health and physique there would be unfold and irremediable loss. Legislation could not make good the loss of a sturdy race of country labourers.

Again, no one doubts that our national life would be the poorer by a decline in our rural life ; but it is sometimes difficult to state in definite terms the extent of the loss. It is well known, however, that contact with the soil leads to an appreciation of nature and natural phenomena which it is difficult, if not impossible, to obtain in any other way. History and literature and art have shown throughout the ages that daily contact with the elemental forces of nature breeds independence of character, virility of mind, constancy of purpose—qualities included amongst those accounted worth while in life. And if perchance, at times, these are allied with other and less desirable accompaniments, the latter, more often than not, are attributable to causes which a well-organised national life could remove or control.

One other point. The possibility of overseas food supplies being restricted in war-time, if not cut off, has been a subject of much discussion, and rightly so. Now this danger has not by any means been removed since the War: neither peace proposals nor more efficient or more destructive engines of war appear to have banished the possibility of war. However much war may be deplored, and however optimistic the supporters of the League of Nations may be, few people have illusions as to the necessity of safeguarding the nation against the possible event of attack. If such necessity is admitted no one can view with unconcern the prospect of a diminishing food production in the future, and the gradual reduction of our agricultural population. This in itself, quite apart from the important reasons already indicated, points to the vital necessity of maintaining an adequate rural population.

**Town and Country Complementary.**—Insistence on the vital necessity of the rural and agricultural worker to the national life is not made with the intention of depreciating or in any way undervaluing the services of the city-artisan in the national organisation. Each has his part to play; the one is complementary to the other. What is to be deprecated is the possibility of a gradual reduction of the number of rural workers and a corresponding increase in the number of urban workers.

Far from misprising the work of the city-artisan we cannot overlook the fact that much of his work has had to do with the wonderful development in power, whether steam or electrical, in modern times, and the possibly even more wonderful inventions in machines and mechanical appliances, which have made available a higher standard of living for a greater number of people than at any previous time in the history of civilisation. Indeed, the multiplication of mechanical contrivances and machinery generally has itself helped to bring about the great aggregations of population in certain localities. But the relatively greater increase in the number of city artisans has already shifted the centre of gravity of the population far enough in the direction of the towns and cities, and if, as it is argued, further transference would tend to deprive the national life of a valuable and essential element, it behoves the State to take stock of the situation and consider what steps to take to provide remedies. The purpose of this article, however, is not to discuss at length such remedies, but rather to make clear the essential factors in the situation, and, in particular, to emphasise the necessity and importance of a contented and

vigorous rural and agricultural element in the national life, and to point out that without such an element a nation such as ours would tend to a position of unstable equilibrium.

**Two Fundamentals of Labour.**—From whatever angle it is viewed it is clear that an adequate rural element is essential to the permanence and stability and full development of our national life. There remains the problem as to how this rural element may best be conserved and strengthened. At the outset two fundamentals stand out clearly and must be considered: (1) adequate provision for decent living; and (2) opportunities for self-development. Both are of the first importance and should be considered in relation to one another.

On the one hand, if the worker pulls his weight, and we assume that in the aggregate he does, he is entitled to a wage which will provide him and his family with at least the decencies of life. On the other hand, the worker and his family are entitled to live their lives not only as members of a community sharing and participating in its common joys and sorrows, but also as individuals improving and developing such talents and tastes as nature has endowed them with. It is not enough that the rural worker should have the wherewithal to exist; he should be so circumstanced as to be able to live.

More than 2,000 years ago Aristotle put the case clearly when he wrote in his *Politics*: "the whole of life is divided into two parts, business and leisure, war and peace, and all our actions are divided into such as are necessary and useful and such as are fine." In the past the tendency has been to overlook the fact that the rural worker, toilsome and exacting as his work may be, ought to have leisure for such things as are "fine" if he is to live his life in a way which will lead to real self-development. His comparative isolation, apart from other factors incidental to his work, has rendered him in the past less ready to look after his own interests than his fellows in the city.

**Wages and Costs.**—Now many will regard decent living as impossible with wages of less than thirty shillings a week. No matter how strong is the urge towards a life in the country, such a wage will inevitably impel men cityward, especially the younger men, where, at least in normal times, a living wage can be earned by an honest worker. If one may judge from recent Press reports, the National Farmers' Union is quite alive to the seriousness of the situation. As matters appear to stand at present the employers cannot pay higher wages

without incurring charges which they cannot afford. Already we are told that many farms are being worked at a loss, and obviously there is a limit to this sort of thing.

On the other hand it is open to question whether producers are making the most of their possibilities in the way of organising the distribution of their produce. Clearly, there is something wrong with a system which allows of so great a difference between the prices of food stuffs paid by the consumer and those obtained by the producer. To the man in the street it seems absurd for the corn-freight, say, for a distance of 20 miles in this country, to be greater than the cost of conveying the same from New York to Liverpool. Even more absurd is the case in which potatoes were sold to consumers in Leeds at prices ranging from £6 to £8 a ton, while the farmer, who had grown them some thirty miles away, received only 30s. a ton. Obviously, the question of organisation in the distribution of farm produce is in a crude and elementary state in this country. No doubt this and similar questions are occupying the careful attention of the producers as well as the Committee appointed by the Government to inquire into this and other matters pertaining to agriculture. It is obvious that just as the co-operative buying of fertilisers and farm implements has done something to reduce the cost of production, so, it is reasonable to suppose, should co-operative distribution mean not only an increase in revenue for the producer, but also a decrease in cost to the consumer. Yet, whatever means are adopted to reduce the costs of production, it is certain that unless a decent wage is paid to the agricultural worker the tendency will be for all but a few to desert the country and gravitate towards the town.

**Two Lines of Development.**—Even if decent wages are paid to the rural worker this tendency will remain, though possibly latent, unless some effort is made to try and equalise other conditions in urban and rural districts. This effort may be directed towards (1) modifying and developing rural education, and (2) making further provision, social and intellectual, for after-school life. In neither of these directions has effort been sufficiently well organised or as deliberately planned as it might be.

The problem of school studies in rural districts has still to be solved. It is admitted that rural education has been greatly improved in recent years, particularly in the remote and outlying districts of Scotland, but it still leaves much to be desired.

Here and there one meets with schools, which, contrary to the formerly prevailing practice, are not now giving their pupils a bias towards the selection of indoor or urban occupations on leaving school. Such schools provide a course of study well calculated to foster a love of country life and a taste for outdoor farm life, a healthy, satisfying life to many lads, who, under former conditions, would have been led to choose urban occupations for which they were unfitted, and in which they would wilt and lose their vitality. If the material rewards of the rural worker were comparable with those of the urban worker this bias towards indoor and urban life, whether given in rural or urban schools, would no doubt tend to disappear.

Various devices have been suggested to encourage an interest in farm life. For example, part-time labour after the age of 12 or 13 has been advocated, but the great objection to this is that it would tend to mortgage a child's future. On this ground alone it would be difficult to justify it. Moreover, it is unnecessary, since a pupil who has a taste for country life can have that fostered if rural schools provide suitable courses of study and encourage a spirit which does not affect to despise agricultural labour.

**Interests and Tastes in Rural Schools.**—This interest in country life could be encouraged without unduly emphasizing the vocational aspect of education, and most certainly without starving that side of education which will bear more directly upon the right use of leisure in after-school life. To a large extent the happiness and contentment of rural workers in the future will depend upon the cultivation of the proper kind of interests in the adolescent and pre-adolescent stages. In itself a decent wage is not sufficient, something more is required. It is as true now as when it was first said, that man does not live by bread alone, and especially true is its application to the case of the rural worker. Interests must be cultivated and fostered, interests and tastes which will make life more worth while for the individual and more worth while for the community. One of the chief among these is the reading habit. The school has still to recognise its possibilities in the fostering of this habit. Few pupils brought up in the right environment fail to acquire a love of reading. How far it satisfies some of the more permanent human instincts and desires is shown in the extraordinary extent to which advantage has been taken of the Public Libraries Act all over the country. The love of reading is only one of many interests which can be encouraged and

fostered in a properly organised rural school. It would be immensely interesting to develop this line of thought, but space will not allow.

**Rural Social and Intellectual Life.**—There remains for our further consideration the subject of the social and intellectual life of the rural community. Much thought has been devoted to the methods of ameliorating the lot of the rural worker and with some success. Experiments of various kinds have been and are being made. Village clubs for men and women, village institutes, travelling cinemas and peripatetic libraries are some of the means employed, all with more or less success.

It will be observed that, in general, effort so far has been directed to trying to approximate the social life of the country to that of the town. But this does not seem to be altogether sound. The city is not a sure guide in a matter of this kind. It should be remembered that one's outlook on life is immensely influenced by occupation and environment. Rural occupations and environment are in the main different from those in the city. There is not the same bustle or excitement in the country as in the town, nor the same opportunity for the quick spread of opinion or rumour. In general, the individual is thrown more on his own resources and his work is less minutely specialized. All this is amply illustrated in the daily work of the agricultural labourer. Leisure to a rural worker has a significance of a different kind from what it has to an artisan in a city. Finally, the community of which he is a part is small and well-defined. There are fewer opportunities for breaking up into sections and, in the main, less need—at all events in social life.

Such considerations as these have pointed to the desirability of instituting an organisation in each village through which the various existing elements might be co-ordinated for social purposes. Such an organisation would incorporate the activities of existing Village Institutes, Village Clubs, Reading Rooms and the like. It would require to be housed in suitable buildings. These would tend to become centres of social life for the cultivation of interests and hobbies, both recreative and cultural. Reading and debating societies, lecture courses of all kinds, study circles, local musical and dramatic societies, would find here a local habitation. The possibilities are great and await systematic development. Further, this is work which might reasonably be subsidised by the Government and by the County Authorities. Such a development would have a profound influence on rural life, and not the least of its benefits would

be the opportunity it would provide for the discovery and the training of talent in rural districts. If rural life is to compete successfully with city life it needs not merely the stimulus of relatively equal wages for the agricultural worker but the stimulus of a relatively equal social and intellectual life.

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## VILLAGE LIFE AND COUNTRY INDUSTRIES.

THE following article is the first of a series on rural industries, which is being prepared by the Rural Industries Intelligence Bureau.\* While this first article is concerned with general aspects of the problem of rural industries, subsequent articles will deal in detail, and from a practical standpoint, with specific industries which already exist or may be revived or established in country districts.† These articles will subsequently be available in pamphlet form for circulation to those interested in the general question or in any of the industries dealt with. Applications for copies of these publications, inquiries arising from them, and requests for further information on the subject matter should be addressed to the *Secretary, Rural Industries Intelligence Bureau, 258/262, Westminster Bridge Road, London, S.E.1.*

There is no need to argue the case for restoring or maintaining the activities of village life. It is desirable in the interests of agriculture, of wholesome social development and of the physical health of the people. Such a revival will depend on the extent to which it is possible to extend the range of employments and to vary the interests of the rural population. No one, who compares village life as it was and as it is can fail to be struck by the former diversity of its interests as contrasted with the present monotony. Apart from the different grades among occupiers of land, there were the small shopkeepers, the carrier, the pliers of various handicrafts whether for domestic or agricultural use. Now the occupation of the land is uniform; the other means of livelihood are passing away; the population consists, more and more exclusively, of farmers and labourers. Year in and year out, employers and employed are face to face

\* The nature and objects of this organisation have already been described in this *Journal*, Vol. XXIX, p. 348, and notices of its establishment and activities have appeared from time to time in the Press.

† A brief article on "Hurdle Making by Machinery in North Wales" appears on page 267 of this number of the *Journal*.



without any intervening grades, and the latter are dependent on the former for their wages and their homes, without any alternative means of livelihood unless they migrate to the town. Instead of being gay the villages are patient, and patience ceases to be a virtue where it passes into fatalism. Rural life would be made infinitely more varied and attractive if country industries could be revived or established on an economic basis. Experiments in this direction are worth trying and more particularly in the case of those industries which have shown the greatest tenacity of existence. If tried, they should be tried at once.

The crisis through which agriculture is passing must seriously affect such rural handicrafts as those of the blacksmith, saddler and wheelwright. Once extinguished, these trades can only be restored with the utmost difficulty. Placed on a more business-like footing, they may hold their own and even become a means of employment to others.

Obviously country industries cannot be revived by attempting to put back the hands of the clock and run counter to economic forces. But economic forces do not all side with the town, and the country is not yet an industrial desert. There are still to be found, for instance, blacksmiths, carpenters, hurdle and fence makers, saddlers, wheelwrights, shoemakers, dressmakers, milliners, spinners, weavers. Many of these trades are in the last stage of extinction by the industrial revolution; but in the instances where they have adapted themselves to new conditions, they still flourish. Machinery, after drawing industry away to city factories, is now creeping out to the effective help of villages and farms in the shape of motor buses, cheap cars and lorries, tractors and small power units. The village inn has been restored to prosperity by motorists; factories themselves have in appreciable numbers moved to country sites to avoid high urban costs. Natural sources, such as streams, rivers and wind are still used, and might be more fully used, to generate power. It has been well said that "the essential problem of the decentralisation of industry is one for the engineer: it is that of the decentralisation of power at low costs." (A. W. Ashby: "Rural Problem.")

There is, however, a social as well as an economic attraction to the town which must be taken into account. It is not only that rural life is voted "dull" and that young people want dances and cinemas, but the careers which it offers, whether on the land or in the village workshop, are laborious and unattractive compared with the shorter hours and lighter work

of the towns. Boys will not ply the saw or swing hammers by the hour as their fathers and grandfathers did. They know instinctively that such manual labour is out of date. It is in fact uneconomic as well as unpopular, and the demand for leisure and for variety of experience, and the rebellion against long hours of heavy bodily work, unassisted by modern machinery, are entirely natural and hopeful symptoms.

To sum up, the principal economic difficulties which country artisans have to face are : competition of factory-made articles, rivalry of shops in towns, decay of apprenticeship, want of market facilities beyond their immediate neighbourhood, and lack of capital and credit which makes the installation of plant and machinery so difficult as to be prohibitive. Generally speaking, country artisans are being or have been reduced from manufacturers to repairers, and even in repair work the townsman often competes successfully. Taking all drawbacks into account, it is not surprising that the village workshop has been left behind.

No survey of rural industries will be attempted here.\* It will be sufficient to quote one or two pieces of evidence, gathered at first-hand, in illustration of the position and needs of some of the village workers.

In a special report to the Rural Industries Intelligence Bureau on conditions in Oxfordshire it is pointed out that where, fifteen to twenty years ago, there was work for three smiths one is now sufficient: that where, before the War, three saddlers were employed only one is necessary; that, during the last twenty years, wherever a village wheelwright has died, his shop has generally been closed, and consequently that the local industry is gradually becoming extinct. Here and there, however, enterprising men are making a stand. Among the forty smiths visited, two had installed welding plant and found plenty of work, and four or five had equipped their shops with machinery capable of coping with the more complex repairs of agricultural implements. Several of the Oxfordshire smiths are urging the formation of a co-operative society for the supply of spare parts for agricultural engines and tractors.

The wheelwrights who were visited stated that factory-made carts had a much shorter life than those made in the country and needed thorough repairing after two years' use. The initial cost of the factory-made cart was, however, as a rule lower, and the town agent would generally give longer credit to purchasers

\* The full material for a complete survey is not yet available, though steadily accumulating from various sources.

than the country wheelwright could afford to allow.\* Inquiries made in Herefordshire of a wheelwright, who employs electric power and possesses a good set of machines, show that farm carts and wagons can be made on the spot at a less cost than those supplied by the wagon works. Where electric power is not available, oil engines produce satisfactory results. The country boy may be once more attracted by the puff of the engine or the buzz of the circular saw.

By common consent, the outlook for saddlers and wheelwrights as at present equipped is gloomy. At the same time the impression given by competent observers in almost every part of the country is that it is not too late to save the remains of local skill. The village wheelwright, for instance, has many advantages that the town manufacturer lacks. He possesses the traditional skill; his materials are ready to hand and can be inexpensively seasoned; his overhead charges are trifling; his potential customers are at his door. But without proper equipment he cannot quote a price to a customer, who, fresh from an Agricultural Show, desires to order a type of cart that he has seen exhibited. He therefore ceases to be a builder and becomes only a repairer. With credit facilities, advice on the best machinery and power, and reliable information on prices and markets such as the Ministry of Agriculture already provides for the farmer, many a competent man might be set on his feet. Nor need the skilled village artisan entirely depend for a living on the farmers' custom.† Country houses, small and large, and the upkeep of their estates may be valuable clients. Often, also, a small piece of land supplements the resources of himself and his family.

To secure the revival and expansion of village life the first step clearly is to maintain and develop the little centres of local skill provided by village handicrafts. If any kind of industrial work is to be provided in the country for wider markets than those of the immediate locality, it is essential that the village artisans should have the necessary equipment and that they should be put in touch with traders or distributors of semi-manufactured goods. Similarly, they ought to be enabled to

\* It must be admitted, also, that the country-made cart is often heavy. Lightness is a selling point to which the local wheelwright would be well advised to give more attention. With better equipment there is no reason why he should not be able to make a strong light cart as easily and economically as a heavy one.

† In Derbyshire and Leicestershire, "the big houses rely on the wheelwright and carpenter for all repairs and sometimes for the making of doors and window-frames, and all the villagers must come to him at last for their coffins." (Report by Oxford Institute of Research in Agricultural Economics).

extend their businesses to "side-lines" for which there is always a local demand.

There are, of course, a considerable number of traditional hand industries surviving in country districts, such as hand spinning, handloom weaving, and the preparation of reeds and osiers and the making of baskets and matting, and various underwood trades. These employments can often meet local demands satisfactorily, but for the supply of distant markets, organisation and information are required. Prices are often inadequate and are undercut by competition of individuals or districts. The want of organisation prejudices producers, drives large buyers to deal with foreign importers, and deprives small English industries of the advantage of the proximity of the home market. In this field it is clear that an efficient intelligence service, such as the Rural Industries Intelligence Bureau hopes to create, and assistance in organising the collection and distribution of orders which Country Industries Limited is prepared to offer, have abundant scope for usefulness.

It is interesting to notice the economic limits within which handicrafts and small industries may flourish side by side with the more centralised forms of urban production. Hand-spinning and hand-weaving do not compete with textile factory goods in the mass production of cloth, where uniformity is no disadvantage, but rather a recommendation or even an essential. The costs of producing the hand-made article are higher because the labour and skill required are greater and the output is slower; but if the product has superior quality and character, it may command a higher price in a special and limited market. Small industries again which supply the varying requirements of individual customers, such as the making of elastic stockings and other silk woven goods for surgical use, do not compete with urban products. Made to measure, they are produced in Leicestershire on the old hand-frames, because this is still the only method of production. Again, the Intelligence Bureau lately had an application from a firm requiring a few pieces of woven material of a particular character too small and special an order for an ordinary weaving factory. In this case a small hand-weaving industry was able to give a satisfactory estimate. Lastly, the command of local supplies of raw materials is another obvious advantage which sometimes enables small trades to hold their own, as in the case of underwood industries.

Country industries are sometimes identified with those "arts and crafts" in which machinery is regarded as the enemy, and

excessive stress is laid on the element of hand-work. No hard and fast line can be drawn between hand-work and machine-work, since the most elaborate machine has been evolved in the course of countless inventions from a simple hand tool. Nor is there any definite dividing line between "artistic crafts" and the products of ordinary industry. Where, for instance, does a basket cease to be industrial and become artistic? Certain highly-skilled hand-industries, however, on account of some special quality, excite an interest which may be disproportionate to the amount of their output and their purely economic value. The most successful always depend on the exceptional gifts of individuals, who are few in number, because originality in art is always rare, and probably no rarer now than at previous periods. The best work always commands its market, though not always its due price. But those less richly gifted may often be helped to succeed by such technical or artistic advice, or such information on sources of material, as the Intelligence Bureau is able to provide.

In this connection it is important to note the need of linking up industries producing hand or machine-made goods with the educational institutes which turn out skilled designers. Without such a link, competent students, some of whom are highly gifted, can only hope to become teachers of drawing, while the average factory is satisfied with the mechanical repetition of designs of little artistic merit, or, at the highest, with attempting nothing more original than a "reproduction." One function of advisory organisations, such as the Rural Industries Intelligence Bureau and kindred agencies concerned with the organisation and training of handicraft workers, is to see that where openings exist for skilled and original artificers and designers they shall not be left out.

The revival of handicrafts has received considerable stimulus from the National Federation of Women's Institutes, which has formed over 2,700 institutes scattered over the country. The institutes are doing valuable work in training women to supply their own domestic needs—a highly important branch of rural industry; and the instruction given by their teachers is also available for those who desire to make a living or to supplement their income by handicrafts.

In the ordinary course of trade a considerable amount of home-work is still done, chiefly by women, for large firms in the towns. In Somersetshire, Wiltshire and Worcestershire, for instance, gloving and clothing firms give out work to the

surrounding villages which can better be done by hand or by hand-worked machines than by power-driven machinery. Similarly, in Leicestershire villages hand-knitting is done at home for shops both in the county and in London. To many families such work provides a valuable supplementary income; and domestic industry of this nature is no doubt capable of extension.

This system has its dangers. If unregulated, it gives the opportunity for sweating. Scattered and unorganised workers are liable to exploitation, where their market depends on the ordinary trade channels. These dangers can only be met with the help of advisers experienced in industrial organisation, and the Committee of the Rural Industries Intelligence Bureau are prepared to recommend precautionary regulations.

In this connection, also, the establishment of Country Industries Limited\* is important. This Society, formed to act in close co-operation with the Bureau as a disinterested middleman, provides methods of trading, which can hope, in many cases, to secure for workers larger returns than they would otherwise receive.

The problem of reviving industries in country districts is made more urgent by special conditions arising out of the War. For a large number of disabled ex-Service men employment in urban factories is often neither desirable nor possible. Many of them can only work under exceptionally healthy conditions at their own pace and in their own time. The Rural Industries Intelligence Bureau is, therefore, carefully considering the possibility of developing in the country certain industries and handicrafts which can provide disabled men with a suitable occupation and enable them to become self-supporting.

The maintenance or revival of rural industries is not a forlorn hope. They are not doomed to extinction by irrevocable economic laws. Village artisans in the more backward and remote districts need to know the possibilities of utilising power and machinery; they require advice on design and other technical points, as well as on the kind of goods for which there is a demand and the locality of suitable markets; they want information on costs and prices, and the purchase of raw materials. With these needs the Rural Industries Intelligence Bureau is prepared to deal. It has experts in its employment and at its disposal as advisers on the technical, commercial and artistic

\* *This Journal*, Vol. XXIX, p. 549.

sides of production. Its Committee of Management includes representatives of different Government Departments through whom it can avail itself of the best information on home and overseas trade, on the industries allied with agriculture and on the available facilities for technical and other training--a concentration of intelligence for which no other agency yet makes satisfactory or sufficient provision.

It is clear that, in addition to advice, practical help of other kinds is much needed. The rural artisan not only wants to know what machine to buy and where; he also requires credit or some system of purchasing his plant by instalments. Small industries in the country districts feel the lack of means of marketing, even where the market is known, and the disadvantage of being compelled to sell in very small quantities or employ expensive middlemen. The same difficulty hampers the business which requires raw material in such small quantities that it can only buy retail. A strictly economic middleman or wholesale merchant of material, etc., who would also organise credit in suitable cases, would meet these difficulties. It is for these purposes that the trading association, Country Industries Limited, which has already been mentioned, has been formed by those interested in the Rural Industries Intelligence Bureau, in order to carry on the commercial activities which are necessary to its success.

Little, however, can be done directly from London. To enable the central organisation to put its resources at the call of local needs, intermediaries are indispensable, and for every reason co-operation must be sought with the many people and agencies who are already at work in the country, some of whom have long and valuable experience. The local officers of the Ministry of Agriculture are co-operating with the Bureau and will make known the opportunities offered. Where Rural Industries Sub-Committees, appointed from the County Council's Agricultural Committees, still exist, they are the natural heads of the work in the counties. Other bodies like Women's Institutes, Village Clubs, and Arts and Crafts Associations are natural allies; and it may be hoped that the branches of the National Farmers' Union, and of the Workers' Unions, seeing how closely their own interests are involved, will be prepared to co-operate. The formation of County Rural Community Committees, representative of all the bodies interested in the development of county activities under the National Council of Social Service, will, it is hoped, give a fresh impetus to the

work. On the trading side, Country Industries Limited is ready to advise on the formation of local co-operative societies for the organisation of workers and of trade, and, if required, to act as their agent. A combined effort, concentrated on both production and distribution, may, it is hoped, restore and establish on economic lines that variety of profitable occupations on which the prosperity and happiness of village life so largely depend.

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## A TRIAL OF HARVESTING MACHINERY.

### BINDERS AND A BINDER AND STOOKING MACHINE.

#### II.

**The Tractor-drawn Binder.**—The modern binder has been established for many years on recognised principles and may be relied upon to perform its operations efficiently and well; for this reason little mention has been made in this report of the quality of the work done by these machines. It may be accepted that the latter was uniformly good, whether drawn by horse or by tractor. The tests were designed to give some indication of the economic possibilities of the tractor-drawn binder and it will be seen that only negative results as regards the cost per acre were obtained in the case of the single binder drawn by a Fordson. Even taking into consideration the difference in the weight of the crops, a very small saving seems likely to be obtainable, and within the limits of experimental error. It cannot safely be asserted that any appreciable saving can be expected from the use of a tractor in this manner.

When two binders were drawn by a tractor there was on the other hand an appreciable saving in the acreage cost of about 15 per cent. This is probably a conservative figure.

These results are consistent with the previous experience of the Ministry with tractor-drawn devices. The full economic advantage of the tractor cannot be obtained unless it is drawing the full load of which it is capable; a wastage of fuel results when only a fraction of the available drawbar load is utilised. In the case in point the drawbar pull needed for the two binders even on the heavier crop of wheat was only 1,250 lb. which is well within the capacity of the Fordson. It is therefore clear that even greater economy would result if two binders each having a full 8 ft. cut were drawn in this manner, provided



the field was sufficiently large and the land reasonably light and flat. When very large fields with light crops and few weeds are to be harvested, such as exist in the United States and Canada, it is of course practicable to hitch three binders to one tractor and the economy is thereby very considerable, but the extreme difficulty of negotiating the corners of the smaller fields of the English farm with such a combination, makes it unsuitable in this country except in the rarest cases.

**The Mechanical Stooker.**—Even with the advent of the binder there still remains a considerable amount of hand labour necessary in the operation of harvesting, notably in stooking the sheaves after cutting. This operation does not require skilled labour and is fairly rapidly performed. Nevertheless it involves an additional cost of from 1s. 3d. to 2s. 0d. per acre, as evidenced by the data obtained in these trials, and any machine that could effect a practical elimination of this charge would reduce harvesting costs correspondingly.

The McCormick stooker is the first machine of its kind that the Ministry has had the opportunity of putting to the test and contrary to expectations it has been found on analysing the data, that no material saving in cost resulted from its use, at any rate in its present stage of development. Since as many as four men are required to keep pace with a binder in stooking a field and this operation can be done without additional hand labour by the McCormick stooker attached to a binder, it appeared that a considerable saving of expense must necessarily result. That this expectation was not wholly justified can perhaps better be understood by an examination of the figures in the tables of cost. Attention may be drawn to the following points:—

1. The average cost of cutting an acre of wheat and stooking it by hand was 7s. 5d. Of this sum 1s. 11d. or approximately 26 per cent. represented the cost of stooking, and the cost of stooking oats by hand represented 22 per cent. of the total cost. Twine represented on an average 42 per cent. of the cost of cutting, and approximately 33 per cent. of the total cost of cutting and stooking.

2. The stooking machine uses a considerable amount of twine, the value of which represents about 9d. per acre, and it is obvious that this additional charge, together with a few pence per acre for capital charges on the stooking machine, cannot leave a wide margin of saving over the cost of hand stooking.

With these considerations in mind, taken in conjunction with the fact that these trials proved the use of a single binder drawn by tractor to be uneconomical, it will be appreciated why the binder and stooker did not effect any considerable saving.

In conclusion it must be repeated that the foregoing must not be interpreted as discountenancing the construction and use of a mechanical stooker. The fact that the device can in its present form show a small saving over hand labour points to the production of an improved and cheaper machine which will materially reduce the cost of stooking. It is clear, for example, that a stooking machine that could operate without the use of twine, would eliminate the most considerable item of cost, and should effectively establish its economic superiority over hand labour where large acreages have to be harvested. It is understood that such a machine is already in existence and was used in the last American harvest.

**General Binder Troubles.**—The subject of binder troubles is too large to be treated adequately here, but it is hoped that the following notes consequent upon the Ministry's investigations will be of service:—

*If a machine fails to start*, the trouble may be localised by following these directions:

(1) Throw the binder out of gear, use the raising and lowering handle and turn the packer crank shaft.

(2) Put the machine in gear, remove elevator chain, and start machine. This should cause the shaft, enter-bar and knife to operate.

(3) Remove the reel chains, replace elevator chains and start again. This will test the elevators. While the reel chains are off, spin the reel by hand.

It is appreciated that many faults may be easily discovered without this procedure, but this systematic examination will ensure the location of any trouble.

*Gear and sprocket wheels.*—Hook-shaped sprocket teeth will cause chain breakage. The hook shape of the teeth is caused through the chains being attached with the bar of the link first. Make sure, therefore, that the chains are mounted on to the sprockets in the correct way. Badly-worn gear wheels are usually due to either (a) bad meshing, or (b) the use of oil when working in sandy or very dusty conditions. (a) An adjustment is usually provided by means of which the gear wheel may be moved along the shaft. The teeth of the pinion

wheel should engage with the teeth on the large bevel wheel in such a manner that they will neither strip nor be deep enough to cause binding. (b) The combination of oil and sand or dust makes a mixture which causes the rapid wear of gear wheels and sprockets. Under such circumstances it is advisable to run the gears dry, but better still is the use of dry or flaked graphite.

*Canvas creeping or broken slats* are usually caused through the elevator not being square, or else the tension of the canvas being greater on one side than the other. The canvas should always be slackened at night in case of heavy dews, otherwise it will stretch and become misshapen.

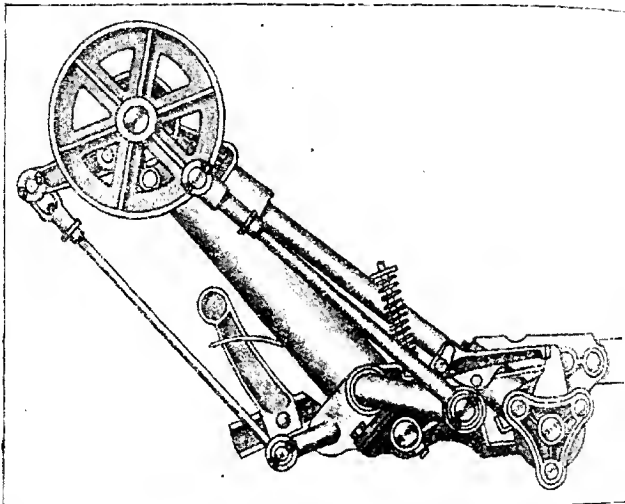


FIG. 7.—Binder Head showing Adjustable Connecting Rods for Needle Shaft (right), and Stop Arm holding Dog (right corner).

*Heavy draught* results from poor lubrication and too tight chains. The tension on the chains may have been caused by raising the main frames and so increasing the distance between the main chain sprockets.

*Badly-shaped sheaves* are due principally to the incorrect manipulation of the levers. The levers provide a very efficient means of adjustment for every condition of crop, but full advantage of them is not always taken.

A frequent fault of operators is that when dealing with short crops they pull back the buttor instead of moving the binder

head to the front. A good position for the buttors is to be as nearly perpendicular to the deck roller as possible. If the buttors are kept approximately in this position the head will have to be shifted, and by this means much of the trouble of uneven or angled butts will be avoided.

*Binder Head and Knotter Troubles.*—Every fault which arises round this part may be located according to its particular symptom. The following are examples of faults which occur:—

(a) Discharge arms fail to revolve exactly, or fail to start. This is due to dog trouble. The dog is a piece of mechanism

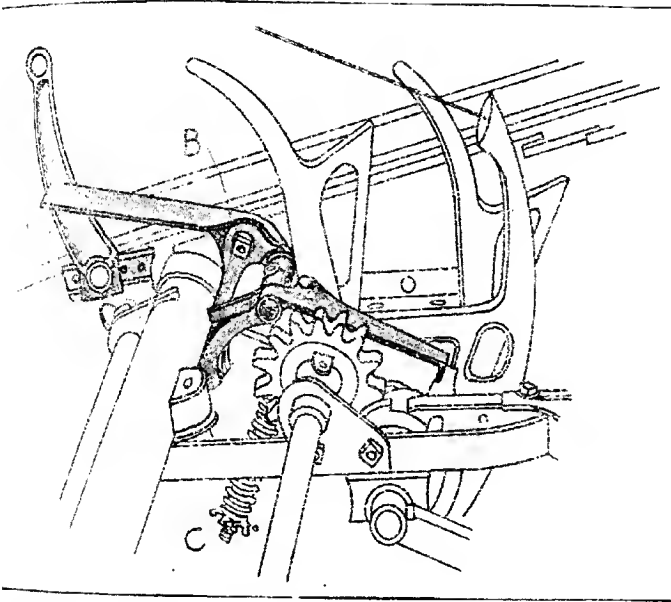


FIG. 8.—Shaffing Mechanism.—A, Compression Arm ; B, Trip Lever ; C, Trip Spring.

which momentarily engages the head with the continuous motion of the dog driver on the packer shaft. A dog spring causes the dog to move when released, so that should this spring be ineffective, the trouble previously stated will result. The remedy is to fit a new dog spring.

(b) Discharge arms revolve continually. All the working parts of a binder head, with the exception of the packers, work in a definite relation with each other. If this relation is broken, one or more parts are said to be out of time. The trouble with the discharge arms revolving continually may be caused by

TABLE I.—GENERAL RESULTS calculated for a Working Day of 8 Hours.  
WHEAT.

Device	Labour Employed	No. of Cutting Hours	No. of Man-Stooking Hours	Total Average Cut and Stooked per 8 Hours		Costs per 8 Hours		Acres Cut per Hour	Cost per Hour		Cost per Acre	
				Cutting	Stooking	Cutting	Stooking		Cutting	Stooking	Cutting	Stooking
Massey-Harris Binder	1	8	21.5	6.8	41.0	8.4	13.2	85	6.9	1.11	8.4	7.11
McCormick " "	2	8	39.8	10.04	59.9	20.0	79.9	1.33	9.11	2.0	2.0	7.11
Two McCormick " "	3	8	55.2	19.00	90.7	31.6	125.1	2.375	15.65	4.9	1.10	6.7
McCormick Binder and Stoker	2	8	-	9.1	68.5 <sup>1</sup>	-	68.5	1.13*	8.66	7.6*	-	7.6
OATS.												
Massey-Harris Binder	1	8	28.24	10.7	49.8	17.7	67.3	1.33	8.45	4.8	1.7	6.3
McCormick " "	2	8	26	12.07	61.9	16.3	78.0	1.51	9.9	5.1	1.4	6.5
Two McCormick " "	3	8	41.8	21.9	94.8	28.1	122.9	2.73	15.4	4.1	1.3	5.7
McCormick Binder and Stoker	2	8	-	12.1	71.1 <sup>1</sup>	-	71.1	1.5*	9.37	6.1*	-	6.1

<sup>1</sup> Cutting and Stooking.

TABLE II. — DETAILED COSTS.  
WHEAT.

Device	Time occupied	Total acreage	Average costs per acre							Cost per ton
			Labour	Cutting		Stocking	Total			
				Fuel	Capital charges*			Twine†		
	hrs. mins.		s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	
Massey-Harris Horse Binder	3 3	3.00	0 8	—	3 1½	2 3	1 11	7 11	2 6	
McCormick	4 23	5.45	1 0	1 10	0 11	2 2	2 0	7 11	1 11½	
Two McCormick	6 36	15.35	0 9½	0 11½	0 9	2 3	1 10	6 7	1 9	
McCormick Binder and Stoker	1 59	6.65	1 1	2 0	1 7	2 10	—	7 6	1 11½	

## OATS.

Massey-Harris Horse Binder	4 41	6.25	0 5 <sup>1</sup> / <sub>2</sub>	—	1 11 <sup>1</sup> / <sub>2</sub>	2 2 <sup>1</sup> / <sub>2</sub>	1 8	6 3	2 9 <sup>1</sup> / <sub>2</sub>
McCormick	11 31	18.50	0 10	1 3 <sup>1</sup> / <sub>2</sub>	0 9	2 2 <sup>1</sup> / <sub>2</sub>	1 4	6 5	2 3
Two McCormick	2 19	1.90	0 8 <sup>1</sup> / <sub>2</sub>	0 8 <sup>1</sup> / <sub>2</sub>	0 8	2 2 <sup>1</sup> / <sub>2</sub>	1 3 <sup>1</sup> / <sub>2</sub>	5 7	1 10
McCormick Binder and Stoker	3 37	5.30	0 10	1 3	1 2	2 10	—	6 1	2 4 <sup>1</sup> / <sub>2</sub>

\* Including interest on capital, depreciation and repairs.

† 4 lb. twine per acre for each binder with the addition of 1<sup>1</sup>/<sub>2</sub> lb. per day for the stocking machine.

‡ Including hire of horses at 5/- per day per horse.

(1) the dog being out of time, or (2) the dog slipping past the stop arm. To remedy (1): while the discharge arms are held in their usual position of rest, the dog should be forced back against the spring as far as possible, and then the whole dog casting should be slipped into position so that the faces of the stop arm and dog just meet. If any play exists between the stop arm and dog after the gearing is meshed, adjust further. (2) The dog slips past the stop arm when the striking faces of the dog and arm become worn to such an extent that the dog can raise the stop arm enough to pass around a second or a third time. If the condition is not very bad, the discharge arm will only make a second revolution occasionally, resulting in a small bundle following a large one. If the construction of the arm is such that its striking face cannot be given a half turn, then a new dog and stop arm will have to be supplied.

*Sheaves which are too tight or too loose.*—There is an erroneous idea that this difficulty can be overcome by tightening or loosening the twine tension on the twine cam. Actually, however, the tightness of the sheaf should only be regulated by means of the trip spring. A tight trip spring will require more straw to overcome its tension, and hence the bundle will be tighter, or vice versa.

*Explanatory to Tables.*—Table I, including the general results, has been calculated for an 8 hour working day to provide a common basis on which the respective capacities of the various machines may be judged.

In order to make the costs as comparative as possible it has been assumed that the capital cost of the various tractors was the same throughout, and the charges for interest on capital, depreciation and repairs, have been calculated on a common basis.

Costs computed from the data actually obtained during these tests are not strictly comparable, as regards the binder and stoker owing to variables introduced, such as the speeds and rates of fuel consumption in the different types of tractors used—difference in the capital cost of the tractor—difference in the weight of the crops cut. The first two have been eliminated by standardising the results on the assumption that a Fordson Tractor was used throughout the trials and a uniform speed was taken as a fair indication of the efficiency of each machine based on the actual results taken in the field. Fuel consumption has been calculated on the actual consumption of the Fordson used in the trial. No attempt has been made to compensate for the difference in the weight of the crop, since any such attempt would have involved the introduction of very arbitrary standards, but as the actual difference in weight recorded was negligible, there can only be a small experimental error.

\* \* \* \* \*

## CLEAN MILK PRODUCTION AND THE MILK AND DAIRIES (AMEND- MENT) ACT, 1922.

ON 1st July, 1923, the Milk (Special Designations) Order, 1923, will come into operation, superseding the Milk (Special Designations) Order, 1922, and the Milk (Special Designations) Amendment Order, 1922. The Order carries out the intention of Clause 3 of the Milk and Dairies (Amendment) Act, 1922, by providing for official recognition of various grades of milk, and lays down the regulations applying to the production and sale of each grade.

The Order aims, in the spirit of the Act under which it is framed, at securing a better milk supply with the least possible interference with the producer and distributor. It provides for the dairy farmer an opportunity to gain official recognition of the grade of milk he is prepared to place on the market, and at the same time gives to the consumer reasonable assurance that, if he orders milk of one of the recognised designations or grades, he will be supplied with milk which has been produced in accordance with the regulations laid down for that grade.

For their own protection all milk producers should make themselves acquainted with the requirements of the Act, whilst those who wish to obtain a licence to sell milk under one or other of the special names provided for in the Order should obtain the Order, with the explanatory memorandum issued by the Ministry of Health.\* A summary of the main provisions of the Act and Regulations will be found at the end of this article.

**Aids to Clean Milk Production.**—The following advice is offered to those who are desirous of producing milk of high hygienic quality.

If the herd of cows is healthy the production of a clean and healthy milk supply does not present any very great difficulties, and should be the aim of every dairy farmer in the country. The elimination of loss by souring should alone be a sufficient incentive to improve methods.

**Health of Cows.**—Great care should be taken not to sell milk from cows suffering from any disease of the udder.

**Water Supply.**—The water supply should not be liable to contamination from surface drainage, this being a frequent cause

\* Memo. 77/Foods, either through a bookseller or direct from H.M. Stationery Office, Imperial House, Kingsway, London, price 2d. per copy.



of serious trouble. Cows should not be allowed to wade in the water from which they drink.

*Milkers.*—Attention should be paid to the health and cleanliness of the milkers. Soap, water, and towels should be provided for washing, and no person suffering from or in contact with anyone suffering from a contagious or infectious disease should be allowed near the milk. The provision of overalls kept specially for milking is a great help.

*Buildings.*—Healthy cows made comfortable and happy will produce more milk than cows kept under bad conditions. Buildings should be constructed with this end in view, as well as to provide housing in which cows can be kept reasonably clean with a minimum amount of labour. Where old, badly-constructed buildings exist much can be done towards the production of clean milk by the frequent removal of manure, ample provision of litter, and grooming of the cows.

The construction of the cowshed does not in itself exert very much influence upon the germ content of the milk, and is never an insuperable barrier to the production of milk of good hygienic quality.

*Cleanliness of Cows.*—The hind quarters, flanks, udder, teats, and the part of the belly immediately in front of the udder should be groomed with a currycomb and dandy brush each day when the cows are tied up. Immediately before milking the udder and teats should always be washed, and this can most conveniently be done by having two buckets of water, one for taking off the thick of the dirt and the other for finishing with. The cloths used for this purpose should be thoroughly washed and sterilised each day. A little personal care in this respect and the use of covered milking pails will greatly reduce bacterial contamination and will almost eliminate the visible dirt in milk.

*Milking.*—Dry hand milking should always be practised, and when the cow's udders and teats as well as the milker's hands are regularly and systematically washed, it will become comparatively easy and is certainly more cleanly than wet milking. A little vaseline may be used when the cow's teats are tender or the milker is suffering from rough hands, but only the smallest smear of vaseline should be used, and care must be taken that the milk never touches the hands. In cases of sore teats the milk should not be mixed with that offered for sale. The first few streams of milk from each teat should be rejected and may be collected in a separate vessel for feeding to calves, pigs or poultry.

*Care of Utensils.*—Milking stools are often an undetected source of bacterial contamination of milk and should be washed and scrubbed frequently.

Milking pails, strainers, straining cloths, washing cloths, and brushes are all frequent sources of contamination unless great care is taken to wash and sterilise them after each time of using. The cloths should first be washed in warm water to which a detergent has been added, in order to get rid of the grease and dirt, after which they may be sterilised in the sterilising chamber or by being immersed in actually boiling water for a short time. Brushes may be similarly treated.

Milking pails, strainers, measures, travelling churns, and all vessels which have been used in connection with milk should be rinsed out with cold water as soon after use as possible. This also applies to the cooler. Neglect to do this or the use of hot water on milk vessels before they have been rinsed out with cold water will result in a thin film—almost like a coat of varnish—being formed on the surface of the vessels. After the first rinsing, the utensils should be thoroughly scrubbed with hot water to which soda or other detergent has been added and again rinsed with clean cold water.

*Sterilisation.*—The washing described above will get rid of the visible or observable dirt on the utensils, but nothing short of sterilisation will get rid of the invisible or bacterial dirt.

The object of sterilisation is to destroy as much of the germ life in the utensils as possible and also to leave the utensils in such a condition as to prevent any possible germ growth during the period when not in use. This can be accomplished by the immersion of the smaller utensils in boiling water for 10 minutes whilst the cooler and milk churns should have boiling water poured over or into them until they become unbearably hot.

A much more convenient and effective means of obtaining sterilisation is by means of steam, which may be generated either in a kitchen copper or a specially made steam generating boiler. For the smaller vessels a steaming chest or chamber into which steam is passed from the boiler may be used. The steaming period will vary from 10 minutes upwards according to the supply of steam and the size of the box. If a thermometer is inserted through a small hole in the lid or side, a temperature of 210°F. is sufficient evidence that the utensils are being satisfactorily treated, and the steaming should be prolonged to allow the contents of the box to reach this temperature. Vessels inverted over a steam jet should be kept in

position until every part of the vessel is too hot to touch with the hand and left for at least three minutes thereafter.

If a copper is available it can be adapted for sterilising purposes by boring a hole through the centre of a wooden lid and fitting a plug. It has been found that the steam from a properly boiling copper is sufficient to sterilise utensils in from 5 to 10 minutes according to their sizes. Buckets, churns, etc., can be sterilised by inverting over the opening in the lid, and smaller vessels by placing in a steamer which may be improvised by using the receiver of a milk cooler or separator. The smaller utensils should be placed on an open wire bed so lodged that the bed is raised about three inches from the lid of the copper and the whole covered with the receiver from the cooler or the separator, over which, in order to assist in the retention of heat, a thick cloth should be placed.

If properly sterilised, vessels should dry automatically, and unless they do so the process is not complete and should be continued. Improperly sterilised moist cans are a source of grave danger, which is not minimised by attempting to dry off the moisture with a cloth. When not in use smaller utensils should be inverted on a slatted shelf and churns are best inverted on a wooden rail about 6 inches from the floor and 9 inches from the wall, to allow of a free passage of air and at the same time prevent dust from getting into the vessel. After sterilisation the cooler should be retained in the steaming chest, or if this cannot be done, it should be hung in position and covered with a clean cloth until required for use again.

*Strainers.*—Where the foregoing methods have been carried out carefully the strainer will only be required to take out occasional hairs and dust that may have got into the milk, but these should be so limited that the straining cloth should show but very little evidence of extraneous dirt even where considerable quantities of milk have passed through. The motto of the dairy farmer should be to “keep out dirt,” not “take out dirt” from the milk.

Straining cloths, if used, should be thoroughly sterilised after each time of using; otherwise they may be responsible for souring the whole supply of milk in a very short time. The use of cotton wool straining pads will prevent this.

*Construction of Utensils.*—Thorough cleaning will be made easier by using only well-tinned utensils, having the seams flushed smooth with solder and without corners or crevices. Rusty utensils and those with the tin rubbed off are difficult to keep clean.

For washing, the cooler should be taken off its stand and placed in a tub, on its own feet; if allowed to rest on the edge of a tub the bottom becomes dented and uneven. A strainer should not be included as part of the cooler.

The receiver or pan of the cooler is easy to clean, but special attention should be given to the tap. Most new taps have no cavity and no crevices.

**Advice and Demonstrations.**—In order to create interest in the clean milk movement, competitions and demonstrations are being arranged at some of the principal agricultural shows. Many of the County Education Committees have arranged for a member of their dairying staff to qualify to give instruction and advice on the production of clean milk, and are prepared to provide demonstrations of clean milking on any farm within the county on application being made to the Agricultural Organiser at the County Education Offices. The Ministry earnestly hopes that farmers wherever possible will take advantage of these opportunities, in order that the milk supply of the country may be placed above reproach.

A brief summary is attached of the provisions of the new Act and Regulations.

**Summary of the Act.**—The Milk and Dairies (Amendment) Act, 1922, affects in several matters milk producers and purveyors generally, even though they may not wish to sell their milk under any of the special designations mentioned therein.

Briefly, the most important features of the Act as they concern the milk producer and retailer are :—

1. Any Local Authority by whom a register of milk purveyors is kept may remove from the register any retail purveyor of milk if they are satisfied that the public health is endangered by any act or default of such retailer. The latter, however, if not satisfied with the Authority's decision has the right of appeal (within 21 days) to a Court of Summary Jurisdiction, and the Local Authority or such retailer has a further right of appeal therefrom to the next practicable Court of Quarter Sessions. The retailer may, in the meantime, carry on his business as purveyor of milk until the final decision is reached.

The Court before whom any person registered as a purveyor of milk is convicted of any offence under this Act may, in addition to any other penalty, on the application of the Local Authority, remove him from the register for such period as the Court may think fit.

2. The Act provides that after 1st January, 1923, milk shall not be sold under any of the following names, viz., "Certified," "Grade A," "Pasteurised," or under any other prescribed designation, or under any name including or resembling any of the descriptions mentioned, unless a licence to do so has first been obtained.

(3) No milk shall be sold or exposed for sale to which has been added any colouring matter, or water or any dried or condensed milk or any fluid reconstituted therefrom, or any skimmed or separated milk; nor can any liquid be sold as milk in the making of which dried milk or condensed milk has been used, milk in the latter case including skimmed milk and separated milk.

(4) The sale, or exposing for sale, of milk from a cow suffering from tuberculosis of the udder is prohibited, and an offence against the Act is committed if it is proved that by the exercise of ordinary care the disease could have been detected. Any person guilty of such offence is liable on summary conviction for a first offence to a fine not exceeding £20, and for a second and subsequent offence to a fine not exceeding £100 or to imprisonment with or without hard labour for a period of six months, or to both such fine and imprisonment.

(5) Any person guilty of contravention or non-compliance with any of the provisions of the Act, save as otherwise provided in the Act, is liable on summary conviction to a fine not exceeding in the case of a first offence £5 and in the case of a second or subsequent offence £50, and if the offence is a continuing one, to a further fine not exceeding 40s. for each day during which the offence continues.

(6) No person shall be convicted of any offence under any enactment relating to the sale of milk in respect of a sample of milk taken after the milk has left his custody and control, if it is proved to the satisfaction of the Court that the churn or other receptacle in which the milk was contained was effectively closed and sealed at the time when it left his custody and control but was not so closed and sealed at the time when it reached the person by whom the sample was taken.

(7) Where the registration of a retailer is refused or a retailer is removed from a register under this Act, the retailer shall not be liable to any action for breach of contract for the purchase of further supplies of milk from a producer if he can prove that such refusal or removal was due to the quality of milk supplied by the producer.

**The Milk (Special Designations) Order, 1923.**—“*Certified*” milk is the same grade of milk as that previously sold under the title of Grade A (Certified).

“*Grade A (Tuberculin tested)*.”—The regulations applying to the production and distribution of this grade of milk are now such as can be complied with by almost any milk producer who is prepared to submit his herd to a tuberculin test and to eliminate therefrom any animal which reacts. The main conditions to be observed in the production of this class of milk are the same as for Grade A with, in addition, a six-monthly tuberculin testing of the herd and the elimination of any reactors, and with the modification that, in consequence of the enforcement of the tuberculin test, the clinical examination is required only once in every six months. The milk must not at any stage be treated by heat.

“*Grade A Milk*,” as defined in this Order, is milk from cows which have passed a clinical examination (*i.e.*, a thorough inspection) by an approved veterinary surgeon once in every three months and any animal showing signs of any disease likely to affect the milk injuriously

must be removed from the herd. The milk produced by this herd must not contain at any time before it reaches the consumer more than 200,000 bacteria per cubic centimetre. In short, this is milk produced from a healthy herd in a cleanly manner. The milk shall not at any stage be treated by heat unless a licence to sell such milk as "Pasteurised" has been obtained, in which case the milk when sold must be labelled "Grade A Pasteurised," and at any time before delivery to the consumer must not be found to contain more than 50,000 bacteria per c.c., and no coliform bacillus in  $\frac{1}{100}$  c.c. in a sample taken before 1st January, 1924. After 1st January, 1924, the maximum count permissible will be reduced to 30,000, with no "*coli*" in  $\frac{1}{10}$  c.c.

"*Pasteurised Milk*" as defined in the Order is milk which not having previously been treated by heat is retained at a temperature of not less than 115° and not more than 150° Fahrenheit for at least 30 minutes and immediately cooled to a temperature of not more than 55° Fahrenheit.

After pasteurisation such milk must not be found to contain more than a specified number of bacteria per c.c.; and the Order specifies that this maximum number shall be 200,000 per c.c. for the current year and, from 1st January, 1924, 100,000 per c.c.

**Licences: How to obtain them.**—For the production of "Certified" and "Grade A (Tuberculin Tested)" milk, licences are granted by the Minister of Health.

The Licensing Authority for the producer of "Grade A" milk is the Council of the County or County Borough, as the case may be, in which the milk is produced. Where a producer bottles and retails it at or from the place of production and has no separate premises, this Authority will grant an inclusive licence to cover distribution as well as production. In all other cases the Licensing Authority is the District Council, or Town Council, or Metropolitan Borough Council, as the case may be.

The procedure and conditions for obtaining a Grade A licence above are outlined below. For fuller particulars see the Memo. 77/Foods referred to.

*What to do to obtain a Licence for the Sale of Grade A Milk.*—Application should be made in writing to the County or the County Borough Council in whose area the applicant's farm is situated, together with an approved veterinary surgeon's certificate showing the results of an examination of the herd carried out not more than one month prior to the date of application.

In the case of a producer only, the fee for an annual licence is £1 1s. 0d., but where a producer bottles his milk and retails it at or from the place of production and has no separate retailing premises, the same Authority will grant a single inclusive licence to cover distribution as well as production, the fee for which is £3 3s. 0d. The cost of the licence and veterinary

inspection must be paid by the farmer. Licences expire annually on 31st December.

*Conditions under which Licences are granted.*

(i) A herd book or register of all the cows in the herd (showing additions and removals) must be kept and all the animals must be suitably marked for purposes of identification.

(ii) An examination of the cows in the herd must be made once in every three months by a veterinary surgeon, nominated by the Licensing Authority. Any animal showing evidence of any disease which may injuriously affect the milk must immediately be removed from the herd and information as to its disposal given to the Licensing Authority.

(iii) If tubercle bacillus is at any time found in the milk the producer must arrange for bacteriological examinations of the milk to be made so that the diseased animals may be identified and removed from the herd.

(iv) The milk must be despatched from the farm in unventilated sealed containers, bearing a suitable descriptive label with the address of the farm, the day and time of production (morning or evening), and the words "Grade A Milk."

(v) If the producer retails his own milk he must fill it into bottles either at the place of production or at separate bottling premises. Each bottle must be closed with a suitable tightly fitting disc and covered with a suitable outer cap overlapping the lip of the bottle and so fastened as to form a secure seal. This cap must bear the name and address of the distributor, the day of production and the designation "Grade A Milk."

(vi) The milk at any time before delivery to the consumer must not contain *bacillus coli* in one-hundredth of a cubic centimetre and must not contain more than 200,000 bacteria per c.c.

(vii) Producers must keep records to show the quantities of the milk produced and the name and addresses of the purchasers except when sold by retail.

(viii) Every facility must be given at all times to any person authorised by the Licensing Authority to inspect the premises, processes of production, equipment, methods and records, and to take samples of the milk (free of charge).

*Refusal to Grant, or Revocation of, Licence.*—A producer's licence shall not be suspended or revoked by reason only of his milk being found not to comply with the conditions of the licence after it has left his custody and control, if he proves that such non-compliance was not due to any act or default of himself or of his servants or agents.

If a licensing authority—other than the Minister of Health—refuses to grant a licence, a person aggrieved by such a decision may within seven days appeal to the Minister, whose decision shall be final.

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## RED CLOVER.

PROFESSOR R. G. STAPLEDON, M.A., and R. D. WILLIAMS, B.Sc.,  
Welsh Plant Breeding Station, Aberystwyth.

RED Clover (*Trifolium pratense*) takes high rank among fodder plants, not only on account of the quantity but also of the quality of its produce. It is one of the most common and widely distributed of the clovers.

A large number of different types of red clover occur; they may conveniently be classified as follows:—

1. Wild or Indigenous Red Clover.
2. Cultivated or Commercial Red Clover:

(a) Broad Red Clover.

(b) Late-Flowering Red Clover or Single-Cut Cowgrass.

Red clover is put on the market under various descriptions, mostly comprising the name "cowgrass"; seed sold under these names is generally only a strain of either broad red clover or late-flowering red clover.

**Description of the Plant.**—Red clover as a crop is generally treated as a biennial, that is to say, as lasting for two years: some strains certainly last no longer, but others persist for quite a number of years. The plant may therefore best be regarded as a short-lived perennial.

On the other hand but few strains survive the harvesting of two successive crops, or the taking of a hay and seed crop in the first year. Most strains have more or less deep-going tap roots, and produce a number of stems bearing an abundance of leaves, each made up of three broad leaflets, which are usually more or less hairy. The flower heads are generally fairly numerous and vary from deep red to delicate shades of pink.

**Wild or Indigenous Red Clover.**—This form is of lower growth than the commercial strains, the leaves are usually smaller and the stems tend to be more woody; a great number of forms occur. The majority of the wild red clovers flower early in the spring.

Wild red clover is met with in fair abundance on some types of old grasslands, chiefly on fairly heavy soils and perhaps to the greatest extent where the grass is periodically mown for hay. Wild red clover is not usually a striking feature of the highest class permanent grasslands.

**Broad Red Clover.**—The commercial strains of broad red clover are very variable; some have spreading hairs on stems and leaf-stalks, while the stems of others have short close-lying



hairs, or are sometimes almost smooth. Broad red clover usually flowers about ten days to nearly three weeks earlier than late-flowering red, and will usually flower freely during the autumn of the year of sowing. It grows rapidly after a first cutting and will thus produce either two hay crops or a hay crop followed by a seed crop.

**Late-flowering Red Clover or Single-cut Cowgrass.**—

This variety is not only later than broad red but produces more stems with considerably more side branches, especially towards the top of the stem. Late-flowering red clover seldom produces any appreciable number of flowers in the year of sowing: it only flowers once in the following season, and although, of course, producing some aftermath, does not normally develop sufficiently to yield a heavy second hay crop; nor will it produce a crop of seed after a hay crop. Late-flowering red clover is decidedly hardier than broad red, and, largely on account of its producing but one crop of fully developed shoots in the first year, it is very much longer lived.

Broad red clover and late-flowering red clover cannot be distinguished easily by the characteristics of the stem, leaf or flower: it is only the manner of growth and time of flowering which afford definite grounds for differentiation.

It must be pointed out that strains of broad red clover are to be met with which flower nearly as late as late-flowering red, whilst early strains of late-flowering red are not uncommon.

**Description of the Seed and Impurities.**—It is not possible to distinguish between the seeds of late-flowering red clover and broad red clover, although the former perhaps tend to be slightly larger, probably owing to the fact that this seed has of necessity to be harvested from the first and only crop of the season. The seed of the wild red clover can similarly not be distinguished with certainty from the commercial forms, although it is usually decidedly smaller than commercial seed grown in Britain and smaller than that from most other sources, while it often, but by no means always, contains a greater proportion of yellow seeds.

The shape of the seeds of red clover is a slightly flattened oval. At the wider end there is a marked projection caused by what is known as the "radicle of the embryo," the part of the seed which becomes the root of the plant. The colour at the broad end varies between light and deepish purple or violet, shading down to yellow or greyish yellow at the narrow end. A sample will generally also contain a certain proportion of wholly

lemon-yellow, yellow-ochre and brown seeds. A well harvested and well matured sample should be bright and have a good colour range, but poorly harvested samples and old samples will be of a uniform dull brown appearance and will contain but few, if any, purple, violet or bright yellow seeds.

The country of origin of red clover seed is a matter of very great importance. It is therefore desirable to be able to distinguish between seed obtained from the several different sources, and particularly between foreign and home-grown seed. This is a very difficult matter, but it is none the less possible for the farmer himself, with a little practice, to distinguish with fair accuracy between home-grown seed and that from certain groups of exporting countries. The chief points of difference are:—

- (a) The character of the weed seeds contained in the sample.
- (b) The weight and size of the seed.
- (c) The proportions of seed of different colours met with in the sample.

The following notes with respect to the seed of the chief nationalities of red clover should be of some assistance in differentiating between samples.

*Home-Grown: English and Welsh Seed.*—All the best strains of late-flowering red clover seed should show evidence of having been harvested in this country.

English clovers are seldom harvested under such favourable climatic conditions as are those from most of the exporting countries. Consequently a fair proportion of brown seeds should not be held to count against the sample, and provided that the sample is pure, germinations of over 75 per cent. should be considered reasonable. English and Welsh samples generally contain considerably less yellow seed than the majority of foreign and Colonial samples, and especially than Chilean, Italian or Canadian.

British-grown seed is usually larger and weighs more per thousand grains than seed from abroad, with the exception of Chilean seed.\* Obviously, British samples should not contain seeds of foreign impurities. There are no impurities that may be regarded as typically British, although excess of Cut-leaved Crane's-bill (*Geranium dissectum*) is more usually associated with British than other samples.

Dodder is sometimes met with in English clover fields; its presence in samples cannot therefore be taken as evidence of foreign origin. Should seeds of lucerne, chicory, or ox-tongue

\* The following are the average weights per 1,000 seed in grammes for some of the chief nationalities:—Chilean 2.24, British 2.00, Canadian 1.63, Italian 1.69, French 1.55, Wild (Indigenous) 1.53.

be present with the dodder, there would be good grounds for regarding the sample as not wholly of English origin.\*

*Chilian Seed.*—This is the largest of the commercial seeds, the samples are always of a bright, bold appearance, and usually contain over 30 per cent. of yellow seed. The germination is invariably high. Most samples contain at least a trace of the large dodder (*Cuscuta racemosa*, var.), and, like most of the foreign clovers, frequently contain lucerne.

*Canadian, French, and Italian Seed.*—The seed of these nationalities is small, usually with fairly high percentages of yellow seed. Dodder is not infrequent in these samples, the "Chilian" dodder being sometimes found in samples purporting to be Canadian and the European dodder in French and Italian. Seeds of Timothy and of alsike clover are very frequent in Canadian samples, whilst lucerne is particularly frequent in Italian and French samples. Both these nationalities are characterised by the presence of ox-tongue (*Picris echioides*), whilst sulla (*Hedysarum*, spp.) is frequent in Italian samples, and wild carrot (*Daucus carota*) more plentiful in samples from France than from other sources.

*Central European Seed.*—Seed from these sources is intermediate in size between British on the one hand and Canadian, French and Italian on the other. Dodder is a more frequent impurity of these than of other European samples, both the large and small species being freely met with. Lucerne is perhaps even a more common impurity than in Italian samples, whilst mayweeds in large or appreciable amount are more often met with in red clover from Central Europe than from other sources. Ribgrass (*Plantago lanceolata*) and docks (*Rumex*, spp.) are met with in samples of red clover from practically all sources.

**Agricultural Uses of Red Clover.**—Red clover is very largely used in rotations, and is also freely used as an ingredient in seeds mixtures for leys of various duration and in mixtures for permanent pasture.

*Rotations and Two-Year Leys.*—In the south of England red clover is chiefly grown as a pure crop for one year, whereas in the north and in moister districts generally it is largely sown with either or both the rye grasses for one- or two-year leys. When used alone the amount of seed sown varies considerably from district to district, but 16 lb. of high grade seed per ft. lower grade seed is used, the germinable equivalent of 16 lb.

\* See Leaflet 326, Injurious Weed Seeds in Grasses and Clovers Harvested for Seed in Britain.

of high grade seed) is for most districts to be regarded as a maximum seeding. In East Anglia the seed is usually drilled into a cereal crop at a rate of seeding varying from 8 to 17 lb. per acre. In mixtures with rye grasses the amount of red clover is usually about 7 to 10 lb.

Remunerative crops of red clover, whether pure or in mixture, cannot be grown at frequent intervals on the same land: it usually needs four years, and often a much longer period, before the soil will again be capable of yielding a good crop. Land which has become incapable of growing clover is termed "clover-sick"; this is frequently due to infection of the ground with the fungus *Sclerotinia trifoliorum*, to eelworm (*Tylenchus derastatrix*) or to a joint attack of both, and it may sometimes possibly be due to the *Glaeosporium* disease of clover.\*

The ordinary biennial broad red clover is usually employed in rotations largely on account of the greater winter keep, earlier hay crop and greater aftermath which it provides, though it should be noted that a good late-flowering strain will generally produce the heaviest hay crop.

There appears to be no doubt that British strains of biennial red clovers are capable of yielding more hay and aftermath, and of affording more winter keep, than the foreign clovers. For one-year leys English broad red from the Eastern Counties is probably the best, but certain broad red clovers from the Western Counties, such as the Vale of Clwyd red and Dorset marl, are, by virtue of their greater persisting qualities, more suitable for two-year leys.

Chilian, New Zealand, and American medium are probably the best foreign clovers for one-year leys, but for two-year leys preference should be given to Canadian and Brittany red clover and to clovers from Bohemia. Italian clover should never be sown.

For stubble and winter grazing broad red grown in the Eastern Counties is undoubtedly the best, while Chilian is apparently the best of the foreign clovers.

*Long Leys and Permanent Mixtures.*—The various strains of late-flowering red clover (single-cut clovers) should always be used in seeds mixtures for three years and upwards since they are more persistent than broad red.

As in the case of the early red clovers, the British strains of late-flowering red are decidedly better than any of the foreign

\* See Leaflets 46 (*Stem Eelworm*) and 271 (*Clover Stem-Rot*) also Plant Breeding Work at Aberystwyth, this *Journal*, Oct. and Nov., 1920; and Jour. R.A.S.E., Vol. 79, pp. 68-88.

late reds. For three-year and possibly four-year leys a good ordinary strain of English late-flowering red is generally to be recommended, but for longer leys and for permanent pastures preference should be given to the extra late Montgomeryshire and Cornish marl types. These latter strains are also applicable to three- and four-year leys in many districts. Of the foreign strains of late-flowering red some of those from Canada have given good results in this country for longer leys.

The American Mammoth, although capable of giving very heavy yields of hay in the first harvest year, has, in Wales at all events, not proved to be long-persisting, and, except perhaps under particularly favourable conditions, has a too restricted growing season to be recommended for inclusion in a long-duration general purpose mixture.

Denmark and certain parts of Sweden produce fairly persistent late red clovers, but clovers from north Sweden and Norway have too brief a growing season to be grown economically in this country. There is insufficient evidence as to wild red clover to warrant one to recommend its inclusion even in permanent mixtures—most of the genuine strains of unimproved wild red clover appear to be very poor yielders, and some at least are certainly not long-persisting plants.

*Seeding and Early Management of Young Clover Leys.*—If the soils contain sufficient lime, satisfactory stands of red clover may be obtained on nearly all types of soil, except sandy, peaty and water-logged soils, but if the land is sour the clover will die back in a comparatively short time. All soils deficient in lime should, therefore, receive a dressing of lime before red clover is sown either alone or in mixtures.

The seed may be sown any time from the middle of March to the end of July. It is usually sown during April with a cereal nurse crop. If sown under winter wheat, the ground should be thoroughly harrowed in spring before sowing, and when the surface soil is dry the seed is sown, then completely harrowed in by means of a light peg-harrow, and rolled.

Special care should be taken in selecting a suitable variety as a nurse crop. Preference should be given to early or medium varieties which tiller sparingly and have a stiff straw of good standing ability, for instance, Yelder, Record, and Victory as oat nurse crops, and Goldthorpe and Standwell as barley varieties. A mixture of oats and wheat, on account of its greater standing ability, has been used as a nurse crop with very good results in certain districts.

A clean, firm seed bed of moderately good tilth is necessary for a good take. In districts of low rainfall efforts should be made to conserve as much moisture as possible in the soil.

The seeds are sown broadcast, either by hand or by a seed-barrow, or drilled by means of a corn drill. If drilled it should not be covered to a depth of more than one inch, but the best depth for covering red clover seeds is three-eighths of an inch to one-half inch. (See this *Journal*, Vol. XXIX, pp. 53, 132, 1125.)

Good takes depend, to a very large extent, on the thoroughness with which the seeds are covered. Since it is not possible to cover the seeds properly when the soil is wet, it is of the utmost importance that the surface soil should be perfectly dry when the seeds are sown broadcast. They should then be thoroughly harrowed in by means of a light peg-harrow or a chain-harrow; these have been found to give better results than the horse hay-rake and the Cambridge roller. The practice of covering clover seeds with the smooth roller alone is not recommended, as very many seeds are left uncovered. The covering implement should always be followed by the roller in order to consolidate the soil. If the soil is inclined to be loose and spongy a Cambridge roller should be employed.

It is advisable when cutting the nurse crop to set the binder knives fairly high so as to avoid serious injury to the young plants.

Red clover seems to respond more readily to applications of phosphate manures and farmyard manure than most crops. If these manures were not supplied to the nurse crop, it will be found a paying proposition to give the young "seeds" a dressing of about 5 cwt. of basic slag or 10 to 15 tons of farm-yard manure during the first autumn. On certain classes of soil it is also necessary to apply an adequate dressing of a suitable potash fertiliser, in order to ensure a good clover stand.

The grazing should be carefully regulated during the first autumn and winter. Red clover should not be allowed to become "winter proud" but, on the other hand, it should not be too closely grazed.

It is not advisable to continue the grazing late into the spring if the clover is intended for hay. Fields which are put up for hay not later than the end of February will, as a rule, give the heaviest crop.

The hay crop should be cut early before the clover attains the stage of full bloom. Not only will the quality of the fodder greatly diminish but the persisting powers will be seriously impaired if red clover is permitted to run to seed.

## POSITION AND PROSPECTS OF EX-SERVICE SMALL HOLDERS.

On the 18th December, 1918, the Government started its scheme for the settlement of ex-Service men on small holdings, and in approximately four years between that date and the 15th January, 1923, 18,960 applicants have been provided with holdings in England and Wales covering a total area of 268,107 acres. All of these, with comparatively few exceptions, are ex-Service men. At the request of the Council of Agriculture for England, the Ministry has recently prepared a report,\* based on inquiries by its District Commissioners, as to the general position of these ex-Service holders.

The report contains, in the first place, a summary of the changes which were made by the Land Settlement (Facilities) Act, 1919, in the conditions under which small holdings were provided. The most important of these was that while before the war County Councils were only authorised to acquire land for which they could obtain rents sufficient to cover all outgoings, under the new Act the Councils are not restricted in this way and the Ministry defrays all necessary and reasonable loss incurred. Owing to the rise in the rate of interest which the local authorities must pay on money borrowed for the purchase of the land and the erection of cottages, farm buildings, etc., and to the greatly increased cost of building, it would not have been possible to settle the men without incurring financial loss. The Act provides, however, that such loss shall fall on the Exchequer and not on local rates.

**Agricultural Conditions in 1921 and 1922.**—Of the 18,960 men settled, about 11,000 have taken occupation of their holdings since the harvest of 1920. Consequently less than 8,000 have derived any benefit from the high prices which were realised for the produce of the 1919 and 1920 harvests. Between Michaelmas, 1920, and the end of 1921 the number who entered into occupation was 7,000. During this period the cost of incoming was at its highest. Tenant right valuations were made on the highest basis known in this country for generations. Cattle, horses and implements purchased by small holders were also very expensive. Unfortunately, the drought of 1921 had disastrous results over a large part of England and Wales, resulting in a scarcity of summer grass in stock-raising

\* Obtainable from H.M. Stationery Office, Imperial House, Kingsway, W.C.2. Price 6½d., post free.

and dairying districts and a small yield of corn on the lighter lands, especially in the East of England. Among growers of wheat and oats, the unfavourable conditions were to some extent relieved by the receipt of the Government Corn Subsidy in January, 1922. But market gardeners who, in many parts of the country, had suffered most severely from the weather conditions received no share of the subsidy. Conditions in 1922, although different from those which obtained in 1921, were no better. The drought in the spring, followed by the unprecedented fall in the value of agricultural produce and stock, produced conditions at the end of the year which caused all occupiers of agricultural land the most serious anxiety. The reduced purchasing power of the public generally has not only had the effect of reducing the price of market garden and special crops, but also makes it extremely difficult at times for growers to effect sales at any price.

The agricultural depression has unquestionably affected the ex-Service small holders no less than other farmers. Few, if any, have succeeded in getting through their first two or three years on the land without losing money, and no amount of industry, knowledge and experience could have prevented them from suffering a serious depletion of capital.

**Proportion of "Casualties."**—In spite, however, of the fact that circumstances have been wholly adverse, the proportion of actual failures among the men settled since the beginning of 1919 has been surprisingly small. The number of failures, *i.e.*, the number who have left their holdings after deducting those who have died or left for personal reasons, amounts to only 1,226 from the Armistice to Lady Day, 1923. During that period, as already stated, the number of men provided with holdings was 18,960, so that the failures may be regarded as 6·5 per cent. for the whole period.

It is interesting to compare these figures with the corresponding figures as to the number of failures among the statutory small holders who were placed on the land by Councils during the period 1908-14. During these years some 14,000 men were provided with holdings and less than 1 per cent. per annum failed, or rather more than 4 per cent. in seven years. This result was obtained on a rising market when conditions were, speaking generally, favourable to the development of the small holding movement. Having regard to the adverse conditions which have prevailed since 1920, the failure of 6·5 per cent. of ex-Service small holders in about three years can scarcely be regarded as unsatisfactory.



Among the factors accountable for this small wastage chief place must be given to the admirable "grit," thrift, and energy displayed by the majority of the small holders themselves. It should also be remembered that, as compared with other occupiers of agricultural land, a small holder has an advantage in that he seldom has to pay away much in wages, the work of his holding being performed principally by himself and his family.

**Abatement of Rent and Provision of Credit.**—The principal means which have been used by local authorities to assist small holders to carry on during recent adverse seasons have been the abatement of rent and provision of credit. As soon as it became apparent that a "slump" in prices had arrived, a demand for a reduction in rents arose in various parts of the country. The Ministry was not prepared to agree to Councils reducing permanently rents at Michaelmas, 1921, and Lady Day, 1922, as it seemed at those dates impossible to foresee what the future course of agricultural prices might be, and there was consequently no satisfactory basis on which to revise rents. On the other hand, the Ministry approved of Councils making substantial temporary abatements in suitable cases so as to meet the exceptional difficulties in which small holders found themselves. Since Michaelmas, 1922, rents have been permanently reduced in many districts. The circumstances, however, vary from county to county, and applications have been dealt with on their merits. The extent to which relief has been given by abating rent may be gauged by the fact that, taking the country as a whole, nearly 20 per cent. of the aggregate half-years' rent roll on the post-war estate was remitted at Michaelmas, 1922. Other remissions were made at Michaelmas, 1921, Lady Day, 1922, and Lady Day, 1923.

Councils have also in suitable cases assisted their tenants to overcome difficulties due to shortage of capital by giving them time in which to pay tenant right valuation, and also by guaranteeing advances from the banks under Section 18 of the Act. The tenant-right in arrears at one time amounted in England and Wales to about £70,000, which is being rapidly reduced by instalments. Similarly, the amount of loans guaranteed by Councils in favour of their tenants is over £150,000. These are, however, methods which need to be very carefully watched by local authorities. While credit often proves invaluable to an energetic and enterprising small holder, the necessity for the regular payment of interest or arrears of debt frequently proves a burden which a less successful man is unable to bear.

**Future Prospects.**—The number of actual failures can be ascertained by statistical returns, but it is more difficult to state what are the future prospects of the ex-Service small holders. That involves a venture into the realms of prophecy. Difficult as it is, however, to foresee the future, one statement can be made without any qualification, namely, that if the 1923 season proves as bad as either 1921 or 1922, and agricultural prices continue as unremunerative, the number of failures is certain to show a serious increase.

An ex-Service man who entered into the occupation of his holding in 1919 or 1920 with a capital of £500 has probably less than £300 left to-day. Everything that he bought then has fallen in value by at least 40 per cent., and the seasons have been such that he has been scarcely able to live from his holding let alone save money. Consequently he is inevitably in a weak position, and another bad year will materially reduce or even destroy his chances of pulling through. On the other hand, the evidence shows that practically all over the country the abatement of rent and other concessions which have been granted have been greatly appreciated by the ex-Service men, and they, with a few exceptions, are determined to make a success of their enterprise.

Taking the scheme as a whole, and having regard to the extremely unfavourable conditions which have prevailed in the last two years, the general conclusions arrived at are:—

(a) that the proportion of actual failures is surprisingly small: up to Lady Day, 1923, the total number of tenants who had left their holdings for financial or similar reasons was 1,226 out of the 18,960 provided with holdings since the Armistice, or 6·5 per cent.;

(b) that the extent to which the number of "casualties" is increased in the near future will depend primarily on the character of the next season or two and the future course of agricultural prices;

(c) that, in the event of the present season proving as bad as either the 1921 or 1922 seasons, the number of failures might be considerably increased; on the other hand, if the general conditions of agriculture improve in the next year or two there is no reason why the great majority of ex-Service settlers should not succeed in their enterprise;

(d) that, while failures attract attention, the most striking fact at the present time is the large proportion of ex-Service

men who are cultivating their holdings well and increasing their head of stock;

(c) that, generally speaking, the " morale " of the stutlers is good and rents are being paid satisfactorily.

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## COUNCIL OF AGRICULTURE FOR ENGLAND.

THE Council of Agriculture for England held its Tenth Meeting on Thursday, 10th May, 1923, at the Middlesex Guildhall, Westminster, and, in the first place, unanimously elected Sir Douglas Newton, K.B.E., M.P., to be Chairman for the year 1923.

**Statement by the Minister.**—The Minister of Agriculture made a statement in continuation of that made by him before the December meeting of the Council. He referred especially to proposals which had been, or were to be, brought forward in the present Session of Parliament. In regard to railway rates, he pointed out that, as a result of the action of the Agricultural Committee of the House of Commons, an average reduction of one-seventh had been obtained in railway rates on agricultural products, which amounted to about  $2\frac{1}{2}$  million pounds. The beer duty had been reduced, which assisted the grower of barley, and the cider duty had been abolished. In connection with the establishment of co-operative milk-collecting depots and cheese factories, as recommended by the Agricultural Tribunal, he drew attention to the provisions of the Trade Facilities Act, by which loans of £5,000 and upwards could be made for such purposes on advantageous terms. For smaller schemes loans would be obtainable direct from the Ministry of Agriculture on similar terms. The remission of the duty on sugar manufactured from English sugar beet would still continue; he was glad to say that the sugar beet industry was really going ahead and flourishing.

The Agricultural Credits Bill would shortly be introduced. The delay in this matter was mainly the result of the criticisms which had been brought forward, but it had been useful delay, inasmuch as it would be found that the annual payments for interest and sinking fund for long term mortgage credits as suggested by the Bill would be about 1 per cent. less than the £6 8s. 3d. suggested in the Credits Committee's Report. A Bill would also be introduced laying an excise duty upon imported

malting barley. This duty would not affect the price of beer. The Merchandise Marks Bill, which had been introduced in the House of Commons by a private Member, had reached a second reading and was receiving his support.

Turning to the question of Agricultural Rates, the Minister said that it had been arranged that a sum of at least  $1\frac{1}{4}$  millions would be granted from the Road Fund towards the upkeep and improvement of rural district roads. The whole question of rating would, however, be dealt with in a Bill which the Government proposed to bring in during another Session, though, in the meantime, it had decided to bring in a smaller Bill in the present Session, to reduce the assessments on agricultural land from one half to one quarter of the annual value and to make good the deficiency out of public funds. This would benefit occupiers of land in England and Wales to the extent probably of  $2\frac{3}{4}$  millions.

In regard to agricultural wages, the Government proposed to introduce legislation for the compulsory registration of wages agreements arrived at by Conciliation Committees.

In conclusion, the Minister said that it was not going to be an easy matter to get these Bills through Parliament, and if agriculturists took up the attitude of saying "After all, these Bills are not very much good to us—we want something more," the difficulties would be very much increased. If all the measures were got through this Session, it would constitute a fairly big thing for agriculture. He asked the Council to help the Government all it could to carry through its agricultural programme, not as everything that could be done, but as being as much as it was possible to do within the present year.

In reply to questions, the Minister said that the question of laying an excise duty on malting barley substitutes, as well as on malting barley, was now under consideration by the Government: that he saw no cause for any suspicion that the rates that were taken off agricultural land would be put upon farm buildings; and that the annual payments from the Exchequer to make good the amount remitted from agricultural rates would vary each year and not be fixed as in the 1896 Act: and that it was proposed to extend the maximum period for long term loans under the Agricultural Credits Bill to 60 years.

*Sir Merrik Burrell* proposed, and *Mr. Hamilton* seconded, a very hearty vote of thanks to the Minister of Agriculture for his statement. *Mr. Dallas* proposed an amendment to the effect that, having heard the Minister's statement, the Council deeply

regretted that the Government intended to do nothing whatever for the agricultural worker. The amendment was, however, not seconded, and the original motion was carried.

The Minister, in reply, thanked the Council and said, with regard to Mr. Dallas's proposed amendment, that it was the deliberate opinion of the Government that the prosperity of the agricultural labourer would be promoted by giving help to agriculture.

**Canadian Cattle for Breeding Purposes.**—Lord Strachie moved :—“ That this Council is opposed to the proposed admission of cattle from Canada for breeding purposes.” He called attention to similar resolutions which had been passed by the principal Breed Societies, as well as by the Agricultural Advisory Committee. In moving this resolution he was doing so on behalf of all breeders and agriculturists in England and Wales. It was remarkable that the Minister was unable to take the advice of his Advisory Committee in this matter, and had announced that he saw no alternative except to proceed with the Order. His Lordship recounted the recent history of the Canadian cattle question and stated the present position under the Importation of Animals Act. The recent pledge in regard to breeding cattle had been given by the late Minister of Agriculture in the late Parliament, and the present Government should be at liberty as regards a domestic affair such as this to reverse the decision of a previous Government or Minister. In any case, the Order, which alone could be the subject of a pledge, could be thrown out by the presentation of an Address by either House of Parliament. Mr. German seconded the motion, which, after further discussion—in the course of which the Minister gave his reasons for considering that the Government held itself bound to lay an Order, and in which Mr. Owles, Mr. Nicholls, Lord Bledisloe, Sir Merrik Burrell, and Mr. Donaldson joined—the motion was put to the meeting and carried unanimously.

**Industrial Interest in Agriculture.**—Mr. W. S. Royce, M.P., moved :—“ That it is necessary to stimulate on the part of the urban and industrial communities greater interest in the development of agricultural England.” The mover called attention to the fact that during periods of agricultural depression the wages of the workers on the land were reduced so low that many labourers were forced out of their employment and migrated to the towns or to the Colonies. In the towns, they frequently depressed labour conditions, and bringing with them feelings against employers in the country created other feelings between

urban and rural communities which was certainly not of goodwill. Labour were showing signs of a better understanding of the situation, but that was not the case with Agriculture. Combinations of traders were exerting themselves to obtain the highest possible prices for the articles which agriculturists produced. This was detrimental to the interests of agriculture.

The motion was seconded by Lord Bledisloe, who suggested three ways in which to stimulate the interest of urban population in agricultural conditions. Firstly, the three organised sections of the agricultural community, the land-owners, the farmers and the labourers, should do all in their power to enlighten the townspeople in regard to agricultural difficulties, because of the importance to the latter of a sound agricultural policy. Secondly, there was the Press, and thirdly, the Government. The Press had been very useful and active in the direction indicated during the last few months. Speakers of the Government might also take suitable opportunities of emphasising the enormous importance of agricultural prosperity to the industrial centres.

The motion was further discussed by Alderman Bellwood. Mr. Cross, Mr. Haman Porter, put to the meeting and carried. Mr. Royce proposed, and Col. Courthope seconded, the suggestion that the motion be referred to the Agricultural Advisory Committee as to what steps could be taken to give effect to the resolution. The Council agreed with the suggestion.

**Cleansing of Ditches and Watercourses.**—Alderman S. V. Hotchkin moved: "That the attention of the Ministry of Agriculture be called to the urgent need of adequate powers being given to County Agricultural Committees to assist, and if necessary to compel, owners, occupiers, and Drainage Authorities, who are neglecting their duties, to clean out ditches and watercourses."

He referred to the fact that owing to the repeal of Part IV of the Corn Production Act, the County Agricultural Committees were placed in a very difficult position, and had not power to deal with many cases of drainage neglect which they felt ought to be dealt with. There were certain areas which had no Drainage Authority in control and there were also small areas where the Drainage Authorities were unwilling or unable on account of the expense to carry out necessary drainage work. The County Committees should have power to deal with these matters, and to bring pressure to bear on individual owners who deliberately neglect their duty of cleaning out ditches

to the great detriment of their neighbours' land. Where there was no Drainage Authority, he suggested that the Ministry should be empowered to advance money to individuals to get drainage works of urgency carried out. The motion was seconded by Mr. Bellwood, and discussed by Mr. R. L. Walker. Mr. McCracken and Mr. Fitzherbert Brockholes, put to the meeting and carried.

**Importation of Foreign Potatoes.**—Alderman H. P. Carter, O.B.E., moved: "That the Government be urged to take steps to avoid disaster to the potato industry of the country by accepting the recommendations of the Tribunal of Economists, and by introducing legislation to prohibit the importation of foreign potatoes, except under licence, when the crop in this country is deficient or defective."

He stated that potato growers had suffered unprecedented loss on last season's crops. He computed it at no less than  $8\frac{1}{2}$  million pounds. Smallholders and ex-Service men were in many cases very hardly hit and County Councils had been compelled to reduce rents to meet the losses sustained. It was very unfair that foreign potatoes should be dumped in this country at a time of our own over-production. Mr. Hotchkin seconded this motion and the debate was continued by Mr. Cross, Mr. Gardner, Mr. Langford, Mr. Patterson, Major Fawkes, and Mr. German. Mr. Clement Smith moved an amendment that all words after "country" (on second line) be omitted. Major Fawkes seconded it, and the amendment was put to the meeting and carried by 21 votes to 16. The amendment was then put as a substantive motion and carried. Mr. Carter suggested that this resolution also be referred to the Agricultural Advisory Committee. His suggestion was seconded by Mr. Fitzherbert Brockholes and agreed to by the Council.

**Protection of the Plover.**—Mr. A. R. White proposed and Major F. H. Fawkes seconded the following resolution which was put to the meeting and carried:—

"That, having regard to the greatly diminished number of lapwings or common plovers (birds which do an enormous amount of good by the destruction of injurious insects in the soil), this Council begs to call the attention of the Ministry of Agriculture to the desirability of their greater protection and preservation."

**Position and Prospects of Ex-Service Men.**—The Report on the present position and future prospects of ex-Service men

settled on the land in England and Wales which had been laid before the Council was then considered. Mr. Denton Woodhead asked for information on two points. First, as to whether any women were working on smallholdings in the country, and if so with what success. Second, that information be forthcoming as to the cost of local and central administration which was absent from the Report. He formally moved that the Report be received. Mr. Hamilton seconded the motion, and pointed out that the percentage of men who had failed was very few indeed and was due, in his opinion, at any rate in Lancashire, to the fact that the County Land Agent was very careful in the selection of men as smallholders. Mr. Nicholls inquired whether the Ministry insisted in the case of Peterborough in their objection to a permanent reduction in rents being made whilst such reductions were being sanctioned in other districts. The position now was that the better the smallholders did, the less likely they were to get their rents put down to an economic basis. Mr. Patterson inquired what period the Report covered. In his county a large number of smallholders were in difficulties. If an abatement of the whole of their rental were given them it would not enable them to carry on. A report of the position in twelve months' time might disclose a very different state of affairs from that set forth in the Report. Mr. German said that the Report read as that of an optimist. He, like Mr. Patterson, did not think that the Report should go forward as a fair example of the present condition of affairs. Alderman Quinney challenged Mr. German's statement, and after further discussion Mr. German moved that the Report be referred back to the Ministry with a request for the Ministry to prepare a Report for the Council giving particulars as to outstanding rents, the amount of loans advanced and repaid, and the amount of valuations outstanding on Lady Day last. Mr. Colin Campbell seconded this amendment. Ex-Service smallholders could not, he said, have started farming at a worse time, and those who had survived had lived through two most difficult years: only 6 per cent. had failed. Mr. Woodhead and Mr. Nicholls spoke on the amendment and agreed to ask for further particulars but did not wish to hold back the Report. Mr. German then expressed his willingness to withdraw the amendment, and the motion that the Report be received by the Council was carried. Sir Francis Floud stated that the figures in the Report were those up to Lady Day, 1923, they gave the numbers of men who had actually failed and left their



holdings up to that date. The Report was a statement of the facts as received from the County Councils. If prices remained as unremunerative as they had been for the last two years the number of failures would be largely increased. The Ministry would be glad to get the further information asked for in the course of the debate and would get it for the same period as the Report covered, i.e., up to Lady Day last. The figures would be ready for the next meeting of the Council.

**Report of Agricultural Advisory Committee.**—The Half-Yearly Report (No. 5) to the Councils of Agriculture for England and Wales of the Proceedings of the Agricultural Advisory Committee was, on the motion of Mr. E. W. Langford, received by the Council. (The Report is printed below.)

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## AGRICULTURAL ADVISORY COMMITTEE FOR ENGLAND AND WALES.

THE following is the half-yearly report (No. 5) to the Councils of Agriculture for England and Wales, on the proceedings of the Agricultural Advisory Committee :—

Since the last half-yearly report, dated 30th November, 1922, was issued the Agricultural Advisory Committee has had five meetings, viz.: on 6th December, 7th February, 7th March, 18th April, and 2nd May, at which the following subjects have been under discussion :—

(1) **The Admission of Breeding Stock from Canada.** The Minister stated at the meeting on the 6th December, when the subject was referred to in connection with the Importation of Animals Bill which was then about to be introduced into the House of Commons, that the Canadian Government had definitely undertaken to admit breeding cattle from this country on the same terms as cattle from Canada were admitted into Great Britain, that any Order of the Ministry laying down terms of admission of Canadian breeding stock under the Bill would be required to be laid upon the table of both Houses, and that if an Address against the Order was decided upon by either House, the Order would not become operative. At the next meeting of the Committee, a draft of the proposed Order was circulated, and it was considered that the Ministry should ask the various Breed Societies as to their views upon the Order itself, and also as to whether a clause should be inserted requiring animals to be tested for abortion disease. At the same meeting, however, the Committee unanimously passed the following Resolution:—"That the Agricultural Advisory Committee recommends that no action be taken under Section (2) of the Importation of Animals Act, 1922, until experience had been obtained as to the working of Section (1)." It was at the same time agreed that if the Government found it impracticable to

\* See this Journal, January, 1923, p. 925.

adopt this advice, the Breed Societies should be consulted as had been at first suggested.

At the following meeting on the 7th March, the Minister informed the Committee that the Government had decided that the proposed Order for the admission of breeding animals from Canada should proceed, and that the Ministry were therefore acting upon the alternative advice given by the Committee to refer the draft Order to the Breed Societies for their views in the first instance. At the next meeting on the 18th April, the Minister informed the Committee that the Breed Societies practically unanimously opposed the Order, but he saw no alternative in the circumstances to placing an Order before Parliament, and he invited the Committee to consider what provisions should be suggested so as to restrict the Order to the best classes of breeding stock only. The Committee, however, decided that the only course they could rightly and logically adopt was to stand by the resolution stated above and decline to agree to the importation of breeding cattle at all.

(2) **The Admission of Store Stock from Canada.**—Early copies of the Importation of Animals Bill were placed in the hands of the Committee at their meeting on the 6th December and the proposed provisions were discussed. It was made quite clear that the Committee could not be responsible for the terms of the Bill, which had been based upon a Conference at which the late Minister of Agriculture had presided over a month previously.

(3) **The Grant of £850,000 for Agricultural Education and Research.**—A statement showing the position of the Schemes so far agreed upon was laid before the meeting on the 6th December. The Minister informed the Committee that the Treasury had agreed to the view that the money should be additional to the State grants which were annually being spent on agricultural education and research, and that the Fund with interest should be utilised over a period of 5 years ending 31st March, 1927. New schemes started out of the money would be maintained after that date by further State funds where necessary, though the Ministry had been requested to reduce this contingent cost for maintenance to the lowest possible amount. The statement which was submitted to the Committee showed that the total of the expenditure so far agreed upon from the Fund stood at £706,885 with a probable annual recurring expenditure after 1927 of £108,000.

The special points decided by the Committee in the period under review in connection with this grant were the following :—(1) That the Ministry should consider again the question of requiring personal guaranties from the governors of agricultural institutions that a definite proportion of the expenses of an approved undertaking should be raised by voluntary contributions by a certain date as a condition of the payment of grants from the Fund. (2) The allocation for animal disease research and education. The main grant was made to Cambridge for the establishment there of an Institute and Professorship for the subject. A suitable grant was also agreed upon for the Royal Veterinary College at Camden Town. (3) The proposal to add a new dairy to the Rolleston Farm Institute at an approximate cost of £3,000, of which £2,250 was proposed to be met by a grant from the Fund, was considered and approved. (4) It was agreed that a grant of from £3,500 to £4,000 per annum for four years should be made to the Campton Experimental Fruit Factory. (5) It was agreed that assistance should be given to a proposal to introduce

merino sheep from the hill country of Peru for the improvement of British wool. The sheep were a gift and their importation would only be sanctioned under careful restrictions so far as the possibility of introducing disease was concerned. The aim of the Ministry in proposing assistance in the matter was to secure that the gift was made the best possible use of from the breeding point of view.

(4) **Standard Rates of Agricultural Wages in Certain Districts.**—The Committee decided at their meeting on 7th February that it is not advisable to hold public enquiries for the purpose of ascertaining standard rates of wages in those districts where no Conciliation Committee decision was in operation. The current rates could, it was thought, be supplied, if and when required, by the principal Unions of Farmers and Workers.

(5) **Hop Production.**—The Committee was informed at its meeting on the 7th February of the circumstances under which it was necessary to suggest a limitation of hop production this year.

(6) **Regulations under the Milk and Dairies Act.**—The Committee was informed that, in deference to the suggestion which had been made to the Ministry of Health by the National Farmers' Union on the subject of the lettering on condensed milk tins, that Ministry had agreed that a statement to the effect that condensed skimmed milk was unfit for infants' food should appear on tins containing that product, and that the lettering should be large and conspicuous.

(7) **Drainage Unemployment Relief.**—The Committee was informed that the monies available under this scheme could be applied in certain cases to pipe drainage work, as well as to the making of open ditches. The cases in which grants for pipe drainage might be approved were those which were "combined" schemes, *i.e.*, schemes dealing with more than one property in the occupation of more than one farmer.

(8) **Agricultural Credit Committee's Report.**—The Minister's attention was drawn to various points as a result of the Advisory Committee's consideration of this Report. The chief were that the rate of interest for long term loans was too high for loans to be of any real benefit to those farmers who need them; that loans had been granted to farmers by the Banks up to 7½ per cent. of present values, or 60 per cent. of the then value of the land a few years back when farms were being bought in consequence of the Government guarantee, and that the Banks would probably be prepared to make advances with a smaller margin than was suggested in the Committee's scheme, though not for an indefinite period; that it was a mistake for the Government to treat agriculture as though it were an ordinary commercial undertaking, disregarding the fact that it was a National institution with a National value; that in order to put the Industry on its feet again the State must be prepared face to the risk of some loss, and in any case to give substantially better terms than the Banks; that the ¼ per cent. to be charged for expenses and profits of operating companies, and the ½ per cent. for a reserve fund for bad debts amounted to a considerable additional charge which was hardly justified in view of the onerous conditions, including a "trustee" valuation, required to be observed where long term credit was to be allowed. The Minister informed the Committee that their observations and criticisms would be borne in mind in connection with the preparation of the Bill which would be introduced into the House of Commons after Easter.

(9) **Fertilisers and Feeding Stuffs Act Amendment.**—This subject had come before the Council of Agriculture at its last meeting, when the question was considered of whether the Ministry's sanction to prosecutions proposed by Local Authorities should continue to be required. It was represented in Committee that this condition in the present Act had resulted in making the Act a dead letter in many districts. It was stated, however, that there had been conferences between farmers, traders, and merchants at which a considerable measure of agreement as to an equitable procedure for all concerned had been obtained. It was finally agreed that the Ministry should appoint a Committee to consider the various amendments proposed to this Act, including that in regard to the sanctioning of prosecutions.

(10) **The Interim Report of the Agricultural Tribunal of Investigation.**—At the meeting on the 2nd May, the Committee discussed with the Minister the decisions of the Government arising out of the consideration of this Report. The first decision of the Government was on the question of railway rates, viz: "The Government are of opinion that the Railway Companies are in a position to reduce rates drastically. The remedy, however, lies in the hands of the industry itself, which can make an application to the Railway Rates Tribunal established by Parliament for such cases. In this connection, meetings between the parties are being arranged and the Ministry of Agriculture has expressed its willingness to give any assistance in its power." The Committee generally approved this decision. It was represented that milk, the charges for which had not been reduced under the recent arrangement, ought to share in it. Incidentally, it was agreed that the charges for licences under the Milk (Special Designations) Order of the Ministry of Health should be reduced, if not abolished, as the Order was one made in the interest of public health and the charges did not assist the production of pure milk.

As to local rates, the Government had decided "That the Road Fund Surplus, amounting probably to over £1,250,000, should be devoted to the relief of rates for the upkeep of rural roads. The Government also intends, pending proposals for dealing with the whole rates question, to introduce a Bill this session to reduce the assessment of agricultural land from one-half to one-quarter, making good the difference by an Exchequer grant. This would be in addition to the proposal as to the Road Fund." The situation was explained in detail to the Committee, which was informed that the concession would be retrospective till 1st April last, and that the Exchequer grant would be a variable one each year so as to make up the whole of the deficiencies in that year.

In regard to wheat offals, the Committee was informed that the Government did not accept the proposals of the Tribunal. The Minister discussed with the Committee the difficulties in the way of accepting the proposals.

In regard to malting barley, the decision was that "the Government accept the proposal that an Excise Duty at the rate of 10s. a quarter be imposed on imported malting barley, to be collected at the brewery, distillery or malthouse, with a preference of one-third on barley imported from the Dominions. It was part of the arrangement concluded with the brewing industry before the introduction of the Budget that this should not involve any rise in the price of beer. The Government propose to introduce a Bill

dealing with the matter in the course of the present Session." The question of the possibility of a tax upon substitutes was raised in the Committee, and the Minister promised to give this point further consideration.

In regard to hops, the Committee were informed that "The Government do not adopt the recommendations of the Tribunal. A little time will be necessary to ascertain what will be the probable future consumption of hops. The present Control will continue to 1925. The Government recognise the claims of the hop-growers and before the expiration of the Control will deal with the question." The Committee expressed agreement with this decision.

The decision arrived at in regard to potatoes was that "The Government are not at present prepared to adopt the proposal of the Tribunal that imports of foreign potatoes be permitted only under general licence of the President of the Board of Trade." The Minister explained to the Committee that in 1922 the total importation of potatoes was not larger than 4 per cent. of the whole supply, and that 1922 was altogether an abnormal year as regards the home crop. He stated, however, that the Government were ready to consider the situation again next session.

As regards Milk Production, it was stated that "The Government are in favour of the proposals made in paragraph 33 (erection of milk collecting depots, etc.) of the Report, and are considering how the proposed assistance can best be given." The Committee were informed that the Trade Facilities Committee were quite prepared to give financial assistance to agricultural undertakings such as the erection of milk collecting depots, bacon factories and so on, in the same way as they gave facilities in other industries. One-third of the capital required for building and equipment could usually be obtained at  $5\frac{1}{2}$  per cent. for 20 years, provided that the loan required was not less than £5,000. The Ministry were endeavouring to obtain from the Treasury additional facilities to assist the smaller cases, e.g., the erection of cheese factories.

In regard to Wages, it was announced that "The Government are not prepared to adopt the proposal for setting up six District Wages Boards. They intend, however, to introduce legislation to make compulsory the registration of agreements arrived at by Conciliation Committees." As a result of the Committee's discussion, the Minister promised to see the representatives of Labour and the Farmers upon it if they wished.

In addition, the proposed facilities under the Agricultural Credits Bill which was shortly to be introduced were briefly indicated. The recommendations which the Advisory Committee had made at an earlier stage had been taken into careful account in drawing up a Bill. There was a prospect of the rate of interest for long term credit in respect of farms which had been brought at the time of the Government guarantees being reduced.

(11) **The Reports of the Proceedings of the Various Advisory and Departmental Committees set up by the Ministry.** Two Reports have been received by the Committee under this head in the period under review. Arising out of a discussion on the proceedings of the Election Culture Committee, the Chief Scientific Adviser to the Ministry stated that the results of the experiments made by the Committee during the last year or two appeared to be trustworthy and to put the question of whether aid could be

even to growth by electricity beyond doubt; whether there could be any practical application of the results, was, however, still to be proved.

It is with much regret that the Committee have to report to the Council the heavy loss which they have sustained through the death of Mr. David Ferrie, of Parbroath, Cupar. Mr. Ferrie was an original member of the Advisory Committee and had rendered valuable services to British Agriculture, most recently as a member of the Foot-and-Mouth Disease Committee. The Agricultural Advisory Committee passed a vote of condolence with Mr. Ferrie's family and instructed that a suitable letter conveying it should be sent to Mrs. Ferrie. His place on the Committee has been filled by the nomination of Mr. John McCaig, of Belnont, Stranraer, by the Secretary for Scotland.

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## SOFT OILY BACON—ITS CAUSE AND PREVENTION.

F. W. JACKSON, B.Sc.

THE lack of uniformity in bacon pigs is one of the chief handicaps of the curer. Variations in the quality of the fat are frequently exhibited, and heavy pecuniary loss is incurred during the disposal of the affected bacon and hams. In addition, the curer's reputation may suffer through no fault of his own.

Soft fat is detrimental to bacon and hams not only on account of wastage when cooking, but also because such fat develops rancidity more rapidly than firm fat. Moreover, the appearance of the bacon leaves much to be desired.

Unfortunately, there is no certain test by which the curer can forecast the nature of the bacon-fat from an inspection of the freshly-killed carcass. Consequently, it is not possible to pick out the defective sides and hams until curing has been completed.

The curer's aim is to trace the *cause* of soft bacon, in order to abolish it. The following pages indicate that soft fat appears to be the result of a form of mal-nutrition, which usually consists in the diet being over rich in oil.

**Nature of Soft Bacon Fat.**—Whereas pale dry mild-cured bacon and hams possess fat which is firm, white and non-greasy to the touch, the soft bacon which is the subject of this article seems to lack any coherence, and is distinctly oily. In colour it may be pure white, but it is more often yellow, there being many gradations and tints of the latter colour. The soft fat is usually subject to rancid changes, which have full play during the maturing process.

A comparison of the properties of these types of bacon-fat enables one to come to a remarkable conclusion, which gives a clue to the origin of the soft varieties.

Soft fat is firm normal fat mixed with oil: that is to say, pigs yielding soft fat have produced normal fat in the usual way, but have mixed with it concurrently a certain amount of oil. The bacon-fat derived therefrom resembles, in its properties, a mixture of normal firm bacon fat with a foreign oil. There is a large amount of evidence to show that the oil forming the adulteration has been derived from the pig's food.

**The Practical Origin of Defective Bacon Fat.**—Curers are usually able to refer back to the feeder, in cases where pigs have furnished defective fat. It has therefore been possible to deduce that defects in the fat are associated with certain foods. Warnings against the excessive use of such foods have occasionally appeared in the Press,\* but so far as is known, no attempt has hitherto been made to arrange such foods in order of relative potency.

One general characteristic possessed by the objectionable foods is apparently a high content of oil. Two aspects of the subject demand attention in consequence:

- (1) Why should a high content of oil in the diet tend to modify the normal quality of the pig-fat?
- (2) Have all oils the same effect as regards both the magnitude and nature of the softness produced?

**Feeding Excess of Oil to Pigs.**—Normally, the pig manufactures its body-fat from starch, and such manufactured fat is presumed to be of maximum firmness and whiteness. If the starch-supply happens to be low, and oil takes the place of starch in the diet, it is reasonable to suppose that the amount of fat manufactured from starch suffers a reduction, and that any excess of oil in the food is used to make good the shortage of manufactured fat.

On the other hand, it is possible that, when the starch supply is excessive, the pig will use starch instead of oil for energy-production, and in this case the *whole* of the oil in the food is liable to be transferred to the fat cells without constitutional change. External conditions too, such as excessive cold or damp may influence the pig to store up every scrap of oil which he can extract from his food.

\* See E. T. Halnan, this *Journal*, Vol. XXVIII, 1921, Oct., p. 668, and "Feeds and Feeding" (Henry and Morrison), 1922, pp. 621, 679.

**Nature of Effects Produced by Excess of Oil.**—If defective pig-fat consists of natural fat mixed with an excess of oil derived from food, the amount of the resulting deviations in character from normal must depend on the properties of the oil concerned.

Most of the oils found in pig-foods are noted for their greater or less thirst for oxygen, and might be classified accordingly. Combination with oxygen promotes rancidity with its accompanying flavours and odours. A special form of rancidity is that shown by the "drying" oils which, in combining with oxygen, change colour to yellow, and produce a varnish-like film over the exposed surface.

It appears probable, though not actually proved, that soft yellow bacon owes its distinctive colour to the existence of a drying or semi-drying oil in the fat. It is important therefore to mention the "drying" property of feeding-stuff oils. This is indicated in Table I. The drying capacity of an oil, however, cannot be expressed numerically, nor does it necessarily indicate the power of the oil for producing soft bacon fat. Some arithmetical method of expressing "softening power" is obviously desirable, in order to arrange the feeding-stuff oils accordingly. Chemical data, which cannot be touched upon here, will enable us to do this.

**Softening Power of Oils.**—Owing to fundamental differences in composition the actual softening power of feeding-stuff oils varies between considerable limits, as indicated in Table I. This table shows the softening powers expressed in figures,

TABLE I.  
RELATIVE POWERS OF VARIOUS OILS FOR PRODUCTION OF  
SOFT PIG-FAT.

<i>Oil.</i>	<i>Softening Power.</i>	<i>Note.</i>	<i>Oil.</i>	<i>Softening Power.</i>	<i>Note.</i>
Linseed ...	60	D	Oat ...	15	?
Soya Bean ...	35	D	Rice ...	14	ND
Maize ...	26	SD	Peanut		
Beech Nut ...	23	SD	(groundnut) ...	12	ND
Cottonseed ...	21	SD	Bailey ...	10	SD
Wheat ...	18	SD	Rye ...	6	SD
Pea ...	18	?	Bean ...	6	SD

NOTE.—D = Drying; SD = Semi-drying; ND = Non-drying oil.

calculated from the chemical properties of the oils. The best way to explain "softening power" is to define it as "the number of parts by weight of firm pig-fat which, if admixed with 10 parts of the oil in question, would furnish a



*blend having a standard degree of softness."* For example, 10 parts of linseed oil mixed with 60 of firm pig-fat would produce a mixture equally as soft as a blend of 10 parts of fine oil with 14 of firm pig-fat. In other words the greater the softening power of an oil, the more pig-fat will be softened by a given weight of it.

**Excess of Oil in a Food.**—The next point to be mentioned is that the *quantity* of surplus oil is quite as important as its quality. In order to grade pig-foods relatively amongst themselves with respect to their softening power, it is therefore necessary to obtain the combined effect of quality and quantity by multiplying the *amount of oil available for softening*, by the *softening power* as taken from Table I.

What is the amount of oil in a food, which is available for softening? In default of any data to guide one, it is necessary to make an assumption or two. Any excess of oil above that required for energy-production, is available for softening. Unfortunately, there is not, as far as is known, any method of determining the amount of oil needed for energy-production. This is because the amount and nature of the other dietary constituents influence the pig in its choice of fuel. It appears possible that the richer the diet in starch, the more likely is the pig to use starch as its source of energy. In such a case the oil is liable to be transferred at once to the fat-cells.

Owing to the meagre state of our knowledge it is impossible to say what proportions must exist between the dietary units in order to minimise this possibility, but we can best guard against this direct transference of oil by having the oil-content of the diet as low as possible. Hence there is no maximum percentage of oil which is *safe*; any oil present is liable to appear in the pig-fat. The effect of the oil on the pig-fat is proportional to its softening power, and hence the best way of grading foods, when considering the possibility of their causing soft fat, is by multiplying the oil-content by the appropriate softening power, and comparing the products obtained. This has been done for various foods in Table II, the products being arranged in descending order under the heading "Softening Power of Food."

It only remains to explain how the oil-content of the food, as given in this table, is obtained. Obviously, for the amount of oil present we must use the "digestible" figure, which is given as a percentage on the actual food. Foods vary in dry matter, in total digestible matter, and in starch equivalent,

and at the present it has been decided that foods can best be compared in oil-content by calculating the percentage of digestible oil on the basis of the starch-equivalent. This then is the figure used in Table II.

TABLE II.

## TYPICAL FOODSTUFFS USED FOR PIGS.

RELATIVE CAPACITY, WEIGHT FOR WEIGHT, FOR PRODUCING  
SOFT FAT.

Foodstuffs	Digestible Oil per cent. on Starch Equivalent.	Softening Power of Oil	Softening Power of Food	Nutritive ratio 1 to
Linseed Cake, foreign	12.2	60	732	2
Soy Beans	29.0	35	700	2
Beech Mast	28.0	23	644	7
Cottonseed, Egypt	25.7	21	540	6
Maize Germ Meal	15.0	26	390	7
Peasets, whole	20.7	12	368	4
Soy Bean Cake	9.3	35	326	1
Cotton Cake, decort.	13.2	21	277	1
Linseed Cake Meal	1.4	60	264	1
Hammy Chop, high grade	9.3	26	242	12
Bre Meal	16.0	14	224	9
Maize Germ Cake	8.5	26	221	5
Distillers' Grains, dry	17.8	10	178	3
Groundnut Cake, undec.	14.1	12	173	1
Maize Gluten Meal	5.4	26	140	2
Patent, prepared	8.8	15	132	5
Brewers' Grains, fresh	13.0	10	130	3
Maize	1.8	26	125	11
Stamps	6.7	18	121	4
Pollards	6.7	18	121	5
Brewers' Grains, dried	11.6	10	116	4
Groundnut Cake, decort.	9.3	12	112	1
Wheat Bran	6.2	18	112	4
Oats	6.7	15	101	7
Maize Gluten Feed	3.6	26	93	3
Soy Bean Meal, extd.	2.2	35	77	1
Fine Middlings	1.2	18	76	5
Barley Bran	5.1	10	51	6
Barley Malt Cakes	3.5	10	35	2
Wheat	1.7	18	31	7
Peas	1.5	18	27	3
Rape	1.7	10	17	10
Beans	1.8	6	11	2
Bre	1.5	6	9	7
Bre, polished	0.3	11	1	13
Peanut Kernels, whole	32.1	—	—	16
Coconut Cake	12.1	—	—	4
Palm Kernel Cake, impd.	12.0	—	—	5
Coconut Cake Meal	8.8	—	—	4
Milk, Whey	3.3	—	—	9
Palm Kernel Meal, extd.	2.7	—	—	3
Bre Meal	1.3	—	—	—
Milk, Separated	1.2	—	—	2
Potatoes	—	—	—	16

Soft bacon fat arises from two causes, both of which must operate together: there must be excess of oil in the food, and the oil must have the power of softening firm pig-fat. In consequence two foods may be equally effective in causing softness if the larger excess of oil in the one food is balanced by the greater softening power of the oil in the other food.

Although Table II may require modification as our detailed knowledge of this subject widens, it appears to fit in with all the facts as at present known: and chiefly it provides a useful guide for pig-feeders by indicating how foods compare with regard to fat-softening.

The column of nutritive ratios has been included in order to indicate that many of the foods cannot in any case be employed alone. If the supplement, called for by an unbalanced food, be chosen from amongst those foods at or near the bottom of the list, the potential danger of causing softness is thereby automatically reduced.

In this connection, it can be realised how dangerous are such foods as maize germ meal and cake, and rice meal. These three foods have almost ideal nutritive ratios, and the unwary might use them as basic components of a diet. It is perhaps significant that maize germ products and rice meal appear to be amongst the most frequent constituents of diets causing soft oily bacon.

In default of more exact knowledge it is difficult to say where the safety-line can be drawn in this list of foods, but an upper limit of 50 units of softening power in the case of the food is suggested. Any food having a greater softening tendency must be blended with one having zero softening power and an appropriate nutritive ratio, so that the mixture has a softening power of not more than 50 units, and the less the better. The diet should contain only one "softening" food at any one time. In the case of nine foods which appear at the base of the table, it is not possible at present to calculate the softening power. The only criterion to apply is, therefore, the oil-content, and those which show the lowest figure should be preferred.

**Note on Fish Meal.**—The case of fish meal is somewhat peculiar. The oils contained in fish are exceptional because of their outstanding tendency to cause softness and rancidity. The writer believes that there is no real difference between "white" fish oils and other varieties in this respect. Moreover, rancid fish-oil is far more objectionable than rancid

vegetable oil. Fish meal varies in composition but its softening power can be taken as 220 units.

This subject is a very controversial one. Whilst it is generally admitted that young pigs derive a considerable amount of benefit from the use of fish meal, the important question of the quantity to be fed, and the far more vital question—from the curer's standpoint—as to whether the use of this meal, in the early stages only of a pig's life, will communicate a taint to the cured hams and bacon, however long the subsequent period during which fish meal is withheld, can only be definitely determined by careful and exhaustive practical tests.

It is believed that such tests will shortly be undertaken. Whatever may be the outcome of these experiments, the effect of the use of fish meal on the trade in home-cured bacon has been so disastrous that, at the present stage, the majority of bacon curers take up the firm attitude of discouraging its use entirely, as their losses in connection with this fishy bacon have been extremely heavy.

\* \* \* \* \*

## HURDLE MAKING BY MACHINERY IN NORTH WALES.

COMMUNICATED BY THE RURAL INDUSTRIES INTELLIGENCE  
BUREAU.\*

*In giving the following brief account of hurdle manufacture as carried on at Lake Vyrnwy, on the estate of the Liverpool Corporation, the Bureau is indebted to Colonel J. H. Forrester Addie, C.B.E., the agent and manager of the estate, for his interest in rural industries and his kindness in arranging a visit to the estate.*

Hurdle-making was started on the Lake Vyrnwy estate rather more than 12 months ago, as there was found to be available a large quantity of thinnings which were otherwise of little use or value. The place is not easy of access; ten miles of mountain road separate it from the nearest railway station, and the cost of transport makes timber grown there unmarketable.

The type of hurdle made is of a heavier kind than the usual cleft variety chiefly produced in England, and will make, in fact, a solid permanent fencing which cattle cannot break down.

\* Inquiries arising out of this article and applications for reprints should be made to the Secretary, Rural Industries Intelligence Bureau, 258/262, Westminster Bridge Road, London, S.E.1.

The sketches show a stock pattern 6 ft. by 4 ft. hurdle with 4 cross bars and also a standard 6 ft. by 3 ft. hurdle and gate. They are made in various sizes and with 4 to 6 cross bars as required.

The hurdles are chiefly of larch and Douglas fir thinnings used green, and, with the exception of fitting them together, they are almost entirely machine made. The posts are about 3 in. by 4 in. in section, and the cross bars are circular morticed into holes about  $1\frac{1}{8}$  in. or  $1\frac{1}{4}$  in. diameter drilled in them. The projecting peg seen in the sketch is the means of securing one hurdle to another, and provides a very simple and effective means of obtaining a solid continuous fence.

**Output and Costs.**—Eight men are employed on this work under a foreman, and their output is from 280-300 hurdles per week. They work at a piece rate which is at present 1s. 2d. per hurdle, and at this price earn considerably higher wages than the other employes on the estate.

When certain improvements in the plant alluded to below are effected, the output should be materially increased, and the rate may be somewhat diminished in consequence. The remunerative value to the estate of the timber used in a standard 6 ft. by 4 ft. hurdle is reckoned at about 8d., and the finished hurdles sell readily at 48s. per dozen, delivered on rail. The transport charges to the nearest station are about 3d. per hurdle, while to the London area or the north and south of England generally it becomes about 8d. or 9d. During the last ten or eleven months between ten and twelve thousand hurdles have been sold to all parts of the Kingdom. Of course, to deal with this quantity, an active and efficient selling organisation is essential, and this and the general management are conducted from Colonel Addie's offices in Shrewsbury, and it is understood that the demand is now considerable, and proving to be in excess of the capacity of the plant.

**Plant and Equipment.**—The industry is carried on practically in the open air, as the workshop consists of little more than a roof over the machinery, and protection on one side from prevailing winds. The machinery and fixed plant consist of one 5-h.p. oil engine driving a circular saw about 18 in. diameter; one 9-h.p. oil engine which drives a circular saw about 28 in. diameter; a special appliance locally made for trimming the ends of the cross bars to a circular shape and to push fit into the mortice holes drilled in the posts. At one time this trimming was done by hand, but this simple apparatus can perform

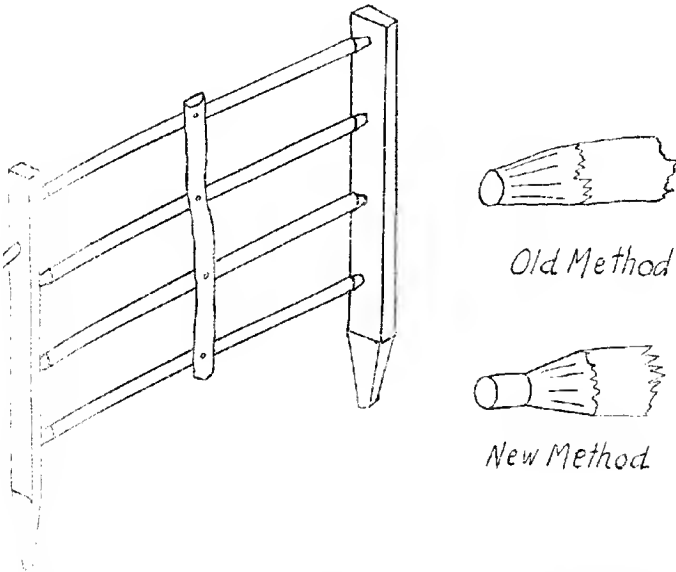


FIG. 1.—Stock Pattern 6 ft. by 4 ft. Hurdle with 1 Cross Bars.

FIG. 2.—Cross Pair Tenons.

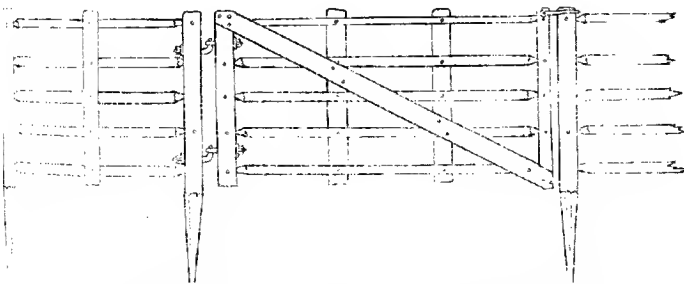


FIG. 3.—Standard 6 ft. by 3 ft. Hurdle and Gate with 5 Cross Bars.

the operation much more perfectly at the rate of about 5 or 6 cross bars per minute as against the old rate of about 12-15 cross-bar tenons per hour.

The sketches show the difference between the old and new methods of trimming. The trimming machine consists of a hollow funnel-shaped tool-holder very similar to a spoke trimmer carrying an appropriately shaped internal knife. This is rotated at from 500-600 revolutions per minute, the rod to be trimmed is gripped near the far end in a hinged tong vice which allows of a small amount of movement backwards and forwards, and the end to be trimmed is forced into the rotating tool head until it comes up against its stop, when it is withdrawn finished. The cross bars having previously been cut by the saw to the correct overall length, they all become uniform as to length and size and shape of the tenoned ends, which ensures that the hurdles can be rapidly put together quite square, and with all the bars tight without any fitting or adjusting being necessary at all.

The posts are cut out with the large saw, and the mortice holes are drilled in them about  $1\frac{1}{8}$  in. diameter, using auger bits in two hand-operated Millers Falls wood-boring machines. Two men are continuously employed on the operation, which is probably the most arduous process in the whole of this hurdle industry, and it is intended in time to convert this also to a power-driven operation, which should have a considerable effect upon output.

## EGG AUCTIONS IN THE EASTERN COUNTIES.

C. A. FLATT,  
*Ministry of Agriculture and Fisheries.*

THE practice of selling eggs by auction has grown considerably during the past ten years, corresponding to a very rapid development of poultry keeping, especially in the Eastern Counties. It may be said that the egg auction is now a prominent feature of many of the weekly country markets.

Selling by auction is particularly useful to the smaller poultry keepers for the disposal of their produce, and also to buyers of new laid eggs for retail locally. The producer of eggs in quantities of 30 dozen and upwards weekly is often able to sell his eggs direct to the retailer, but the many people who now keep

poultry in small numbers, and the smallholders and farmers, whose output is also limited, especially in the winter months, are not well placed for direct trading; and to these the auction offers a very favourable outlet. It is also favourable to the local shopkeepers, since, where the eggs are collected at their source by dealers or by agents for large organisations, there is frequently a shortage of new laid eggs available for local consumption during the autumn and early winter months, owing to the transfer of the local produce direct to London and other large consuming centres. The auction system therefore results in a more even distribution and should have the effect of stabilising the price.

The alternatives to the auction are frequently unsatisfactory, as they leave the producer in a poor position to make a bargain. For instance, if the eggs are collected at the door, the producer is not in a position to know the state of the market; and where the eggs are taken into the local market and sold to dealers, the price is generally fixed by the latter beforehand. Although the competition in egg dealing is keen, unfair advantage is sometimes taken of the producer under both these methods. On the other hand, when eggs are bought in this way unscrupulous producers will sometimes take advantage of the dealer by selling him stale eggs, with little risk of detection at the time of sale. In consequence, dealers usually fix their prices so as to cover losses incurred in this manner, with the result that the reliable producer receives less for his eggs than their value, while the unscrupulous and careless producer receives more than fair value. A premium is thus placed upon careless and unfair methods of marketing.

While it is possible that other methods of marketing practised in particular districts may be better adapted to the local conditions, the sale of eggs by auction has much to commend it in districts in which it has not yet received a trial. The breaking down of a long-established local custom and its substitution by something entirely fresh is not always easy of accomplishment, and this is especially so where the personal interests of individuals are affected. Egg auctions do not grow in a day and many of the best of these markets have taken several years to develop. They succeed best when within reasonable reach of the large local consuming centres from which the buyers can attend profitably without undue loss of time or expense in travelling. A sufficiently large quantity of produce is, of course, necessary to attract the buyers, and the bigger the



market the more attractive it becomes to the best buyers. These egg auctions, in the Eastern Counties at any rate, probably realise the best prices, as compared with other methods of sale, during the seasons when eggs are scarce, but when once established they offer a good and steady market for the produce at all seasons.

There are many practical features which favour this method of marketing:—

(1) The interests of the auctioneer lie equally with the vendor and the purchaser, and to retain his business he must satisfy both parties, so far as this lies in his power. A poor price will drive away the vendor, and excessive prices wean the buyer from the market.

(2) Responsibility for payment is accepted by the auctioneer, which eliminates the producer's risk of bad debts. His charges are fixed on a commission basis, and the producer's cost of marketing is therefore regular.

(3) Since the responsibility for obtaining a fair market price rests with the auctioneer, he makes it his business to prevent "rings," and is generally very successful.

(4) The buyer has a fair opportunity to examine the produce before sale. By regular attendance he can also secure the class of eggs he requires and gain confidence in the eggs sent by individual producers.

(5) The eggs are usually offered with the name of the producer, and in some cases a guarantee is given signed by the producer that these are new laid. This practice brings most satisfactory results.

(6) Complaints after sale are investigated by the auctioneer, who knows the vendors as well as the buyers. If a complaint proves to be justified, a warning is given to the vendor, and repetitions of the offence will result in refusal to accept further produce from him for sale in the market.

(7) As a rule produce collected by dealers is not accepted in the auction market, for the reason that the vendor cannot be held entirely responsible.

(8) A vendor who markets his eggs carefully will benefit by receiving a price which is frequently 3d. per dozen higher than that paid for carelessly marketed consignments.

While grading to size and colour is not yet generally practised, and does not usually appear to recompense the producer for the trouble involved, it is nevertheless sometimes done to advantage, and will probably prove of more importance in the

future with the growth of competition. There is a noticeable tendency to grade up the produce in most auction markets where the system is well organised. In view of the growth in home production and of the competition from foreign eggs this is an important feature.

The cost of transit to the auction market, as against the convenience and saving from collection at the door by a dealer, is sometimes a serious consideration to producers of small quantities of eggs who live at a distance from the auction. This has been overcome in some instances by the organised collection of the eggs by carriers from village centres.

There is always a large amount of work in the handling of eggs in small lots, and in consequence the sale of eggs is not always sufficiently attractive at first to the auctioneers of poultry, but when once the auctioneer has taken up this work the business has steadily increased.

The advantages of the system are that the charges for auction are moderate, the auctioneer does a satisfactory business, the producers receive prices which are in accordance with supply and demand, and a convenient market is established for disposing of eggs sent in by both large and small producers.

In practically every market live poultry are sold by auction, and in many cases special premises are provided at which the egg and poultry auction is held. The inclusion of fruit and vegetables in these auctions is also sometimes encouraged by the auctioneer, and proves an additional benefit to the allotment holder, whilst tame rabbits are sometimes sold in considerable numbers, and occasionally goats.

\* \* \* \* \*

## MONTHLY NOTES ON FEEDING STUFFS.

E. T. HALNAN, M.A., Dip. Agric. (Cantab.),  
*Animal Nutrition Institute, Cambridge University.*

**The Place of Silage in Stock-Feeding.**—Farmers in increasing numbers are now turning their attention to the production of silage, with a view to making the farm self-supporting for stock-feeding, and at the same time to reduce the area under roots without decreasing the amount of food produced. The comparative claims of roots and silage as stock foods have been exhaustively and critically dealt with by Sir Daniel Hall in a recent paper read to the Farmers' Club, and readers are referred

DESCRIPTION.	Price per Qr.		Price per		Manurial Value per Ton.	Cost of Food Value per Ton.	Starch Equiv. per 100 lb.	Price per Unit. Starch Equiv.	Price per lb. Starch Equiv.
			Cwt.	Ton.					
	s.	lb.	s.	£ s.	£ s.	£ s.	£ s.	s.	d.
Wheat, British . . .	57/0	504	11/1	11 2	0 18	10 4	71/6	2/10	1/5
Barley, British Feeding . . .	31/6	400	8/10	8 17	0 14	8 3	71	2/4	1/2
" Danubian " . . .	31/-	"	8/8	8 13	0 14	7 19	71	2/3	1/2
" Persian " . . .	28/6	"	8/-	8 0	0 11	7 6	71	2/1	1/2
Oats, English White . . .	33/-	336	11/-	11 0	0 16	10 1	59/5	3/5	1/2
" Black & Grey . . .	31/6	"	10/6	10 10	0 16	9 14	59/5	3/3	1/2
" Scotch White . . .	37/6	"	12/6	12 10	0 16	11 11	59/5	3/11	2/0
" Canadian No. 2 . . .	"	"	"	"	"	"	"	"	"
" Western No. 3 . . .	31/-	320	10/10	10 17	0 16	10 1	59/5	3/5	1/2
" Feed " . . .	29/-	"	10/2	10 3	0 16	9 7	59/5	3/2	1/2
" American " . . .	28/-	"	9/1	9 2	0 16	8 6	59/5	2/9	1/2
" Argentine " . . .	27/-	"	9/5	9 8	0 16	8 12	59/5	2/11	1/2
Maize, Argentine . . .	42/-	480	9/10	9 17	0 15	9 2	81	2/3	1/2
" American " . . .	40/9	"	9/6	9 10	0 15	8 15	81	2/2	1/2
Beans, English Winter . . .	50/-	532	10/6	10 10	1 17	8 13	67	2/7	1/2
" Rangoon " . . .	"	"	8/9	8 15	1 17	6 18	67	2/1	1/2
Millers' offals--									
" Bran, British " . . .	"	"	"	6 10	1 10	5 0	45	2/3	1/2
" Broad " . . .	"	"	"	8 5	1 10	6 15	45	3/-	1/2
" Fine middlings (Imported) . . .	"	"	"	9 2	1 5	7 17	72	2/2	1/2
" Coarse middlings (British) . . .	"	"	"	8 0	1 5	6 15	64	2/1	1/2
" Pollards (Imported) . . .	"	"	"	6 17	1 10	5 7	60	1/9	1/2
Barley Meal . . .	"	"	"	9 12	0 14	8 18	71	2/3	1/2
Maize . . .	"	"	"	10 5	0 15	9 10	81	2/1	1/2
" Germ Meal . . .	"	"	"	9 5	1 2	8 3	85/3	1/11	1/2
" Gluten-feed . . .	"	"	"	8 17	1 12	7 5	75 6	1/11	1/2
Locust Bean Meal . . .	"	"	"	8 0	0 11	7 9	71/1	2/1	1/2
Bean Meal . . .	"	"	"	12 5	1 17	10 8	67	3/1	1/2
Fish . . .	"	"	"	16 15	4 18	11 17	53	1/6	2/-
Linseed . . .	"	"	"	21 12	1 16	19 16	119	3/1	1/2
" Cake, English (9 7/8 oil) . . .	"	"	"	16 10	2 4	8 6	71	2/3	1/2
Cottonseed Cake, English (Egyptian) . . .	"	"	"	"	"	"	"	"	"
" Seed (5 3/4 oil) . . .	"	"	"	4 10	2 0	5 10	42	2/7	1/2
" " Egyptian (5 3/4 oil) . . .	"	"	"	7 7	2 0	5 7	42	2/7	1/2
Coconut Cake (6 7/8 oil) . . .	"	"	"	8 0	1 15	6 5	73	1/9	1/2
Palm Kernel Cake (6 7/8 oil) . . .	"	"	"	6 5	1 7	4 18	75	1/1	1/2
" Meal (2 7/8 " ) . . .	"	"	"	5 5	1 8	3 17	71/3	1/1	1/2
Feeding Treacle . . .	"	"	"	4 10	0 9	4 1	51	1/7	1/2
Brewers' grains, dried, ale . . .	"	"	"	7 7	1 7	6 0	19	2/5	1/2
" " porter . . .	"	"	"	7 0	1 7	5 13	49	2/4	1/2
" " wet, ale . . .	"	"	"	1 4	0 11	0 13	15	0/10	0/4
" " wet, porter . . .	"	"	"	0 19	0 11	0 8	15	0/6	0/2

\* At Liverpool.

NOTE.—The prices quoted above represent the average prices at which actual wholesale transactions have taken place in London, unless otherwise stated, and refer to the price ex mill or store. The prices were current at the end of April and are, as a rule, considerably lower than the prices at local country markets, the difference being due to carriage and dealer's commission. Buyers can, however, easily compare the relative prices of the feeding stuffs on offer at their local market by the method of calculation used in these notes. Thus, suppose coconut cake is offered locally at £10 per ton. Its manurial value is £1 15s. per ton. The food value per ton is therefore £8 5s. per ton. Dividing this figure by 73, the starch equivalent of coconut cake as given in the table, the cost per unit of starch equivalent is 2s. 3d. Dividing this again by 22.4, the number of pounds of starch equivalent in 1 unit, the cost per lb. of starch equivalent is 1.21d. A similar calculation will show the relative cost per lb. of starch equivalent of other feeding stuffs on the same local market. From the results of such calculations a buyer can determine which feeding stuff gives him the best value at the prices quoted on his own market. The manurial value per ton figures are calculated on the basis of the following unit prices:—N, 1bs. 5d.; P<sub>2</sub>O<sub>5</sub>, 4s. 3d.; K<sub>2</sub>O, 2s. 10d.

to this paper\* for details as to the comparative costs of producing roots and silage, as these notes deal only with the feeding of silage.

It has been suggested, and the suggestion is worthy of serious consideration, that the problem of feeding dairy cows by the soiling system can only be solved commercially by the adoption of silage in addition to feeding the green crops. The silo would then act as a convenient method of dealing with surplus green crops, and the silage made would prove a very convenient standby in the event of failure or partial failure of any green crop grown for soiling.

At first it was thought that silage would replace the hay crop, whereas now the tendency is to look upon it as a root substitute. Actually it is neither, and little harm can result if silage is regarded as a hay plus root substitute. In stock-feeding, roots are chiefly used as a source of carbohydrates; their laxative properties and the absence of woody fibre make them an excellent food for mixing with hay and straw chop.

#### FARM VALUES.

CROPS.	Value per Manurel Ton on Farm.		Food Value per Ton.		Starch Equivalent per 100 lb.		Value per unit S.E. s. d.		Market Value per lb. S.E. lb. S.E.	
	£	s.	£	s.	£	s.	s.	d.	lb.	S.E.
Wheat - - - -	8	15	0	18	7	15	71.6	2/2	1.16	
Oats - - - -	7	5	0	16	6	9	59.5	2/2	1.16	
Barley - - - -	8	8	6	14	7	11	71.0	2/2	1.16	
Peas - - - -	2	3	0	4	1	19	18.0	2/2	1.16	
Swedes - - - -	0	18	0	3	0	15	7.0	2/2	1.16	
Mangolds - - -	0	16	0	3	0	13	6.0	2/2	1.16	
Good Meadow Hay -	4	11	0	16	3	15	31.0	2/5	1.29	
Good Oat Straw -	2	9	0	8	2	1	17.0	2/5	1.29	
Good Clover Hay -	5	1	1	4	3	17	32.0	2/5	1.29	
Vetch and Oat Silage -	2	1	0	8	1	13	14.0	2/5	1.23	

Average samples of silage and hay contain approximately 10 per cent. and 26 per cent. respectively of woody fibre. It is the woody fibre present in a feeding stuff that chiefly determines the quantity of that feeding stuff that an animal will eat. Thus, if a 3-year-old bullock is allowed to have hay, silage or roots *ad lib.*, it will be found that the maximum amount it will eat will be in the region of 25 to 30 lb. hay, 50 to 60 lb. silage, or no less than  $1\frac{1}{2}$  cwt. roots. This is shown in the rations given by stock-feeders using these feeding stuffs. The average amounts included in a ration varies from 8 to 15 lb. hay, 20 to 40 lb. silage, and 30 lb. to  $1\frac{1}{2}$  cwt. roots, according to the amounts available on the farm.

\* "Can Silage be substituted for Roots." Journ. of the Farmers' Club, Part II, 1923.

From the consideration of the chemical composition of silage, the following general statement can be made, which will be found to be supported by practice. Silage can be used with safety and advantage in feeding horses, sheep, cows and bullocks, but the fibrous character of silage precludes its use to any extent for pigs. Silage can be used to a limited extent for breeding sows and store pigs, but it is not advisable to give it to fattening pigs. The writer would be glad to hear from any farmer whose experience in feeding silage causes him to hold a contrary view.

## PRICES OF ARTIFICIAL MANURES.

NOTE.—Unless otherwise stated, prices are for not less than 2-ton lots for, in towns named, and are net cash for prompt delivery.

DESCRIPTION	Average Price per ton during week ending May 9th.				Cost per Unit at London
	Bristol	Hull	L'pool	L'ndn	
	£ s. d.	£ s. d.	£ s. d.	£ s. d.	s. d.
Nitrate of Soda (N. 15½ per cent.) ...	14. 0	13.15	13. 10	13. 1	16.10
" " Lime (N. 13 per cent.) ...	...	12. 0	...	12. 7	19. 0
Sulphate of Ammonia ordinary (A. 25¼ per cent.)	16. 0*	16. 0*	16. 0*	16. 0*	(N)15. 5
" " " neutral (A. 25¼ per cent.)	17. 3*	17. 3*	17. 3*	17. 3*	(N)16. 2
Kainit (Pot. 12½ per cent.) ...	...	...	...	2. 2	3. 5
" " (Pot. 14 per cent.) ...	2. 5	2. 1	2.10	2. 7	3. 5
Sylvinit (Pot. 20 per cent.) ...	...	...	...	3. 0	3. 0
Potash Salts (Pot. 30 per cent.) ...	...	...	...	4. 5	2.10
Muriate of Potash (Pot. 50 per cent.) ...	9.10	7.10	8. 0	8. 0	3. 2
Sulphate of Potash (Pot. 48 per cent.) ...	...	12.15†	11.15	11.10	4. 9
Basic Slag (T.P. 30-32 per cent.) ...	...	...	...	3.15§	2. 5
" " (T.P. 26 per cent.) ...	...	2.10§	...	...	...
" " (T.P. 24 per cent.) ...	...	2. 6§	2. 7§	...	...
" " (T.P. 20-22 per cent.) ...	...	2. 3§	...	2.12§	2. 6
" " (T.P. 16-18 per cent.) ...	...	...	2. 0§	2. 8§	2.10
Slag Phosphate (T.P. 60 per cent.) ...	...	...	...	6.15§	2. 3
" " (T.P. 50 per cent.) ...	...	...	...	5.15§	2. 4
" " (T.P. 40 per cent.) ...	...	...	...	...	...
Superphosphate (S.P. 35 per cent.) ...	4. 7	...	4. 5§	3.15	2. 2
" " (S.P. 30 per cent.) ...	3.17	3. 5	3.15§	3. 7	2. 5
Bone Meal (T.P. 45 per cent.) ...	9.10	9.10†	9. 5	8.12	...
Steamed Bone Flour (T.P. 60 per cent.) ...	8.10†	7.10†	7. 0	6.12	...
Fish Guano (A. 9-10, T.P. 16-20 per cent.)...	12.15	...	12. 5	13. 7	...

Abbreviations: N.=Nitrogen; A.=Ammonia; S.P.=Soluble Phosphate; T.P.=Total Phosphate; Pot.=Potash.

\* Delivered in 4-ton lots at purchaser's nearest railway station.

† Delivered (within a limited area) at purchaser's nearest railway station.

‡ At Goole.

§ Prices include cost of carriage from works to town named. Hull prices include delivery to any station in Lincolnshire or Yorkshire. Cost to purchasers in other districts will be greater or less according to the distance of different purchasers from the works.

IN May of last year there appeared in the Ministry's *Journal* an article by Mr. Warren, Manager-Secretary of the Framling-

**A Successful  
Egg and Poultry  
Co-operative  
Society.**

ham and Eastern Counties Co-operative Egg and Poultry Society, describing the origin and development of the Society, and the methods of working by which it had advanced to its present leading position in the egg industry. The Annual Report was presented at the Society's meeting on 20th February.

According to the report, the net profit for the year ending 31st December, 1922, was £5,441 5s. 1½d., as compared with £1,322 4s. 11½d. for the previous year. It is stated that the membership had increased from 5,091 (holding 53,031 shares) in 1921 to 5,373 (holding 56,291 shares) in 1922. The number of eggs purchased in 1922 is given as 22,327,712 and the value of sales (including poultry, etc.) £194,804—a decrease on the 1921 figure, caused, it is stated, to a great extent by lower values. The profit made during the year allowed payment of interest at the rate of 6 per cent. on the share capital, a 10 per cent. bonus to employees, and a bonus on the business done in eggs and other goods (poultry, rabbits, butter, etc.) by members at the rate of 6d. in the £. totalling £3,293. £472 was placed to reserve fund and a balance of £412 carried forward. The value of stock in hand at the end of the year was £1,634 14s. 8d. An increased trade in poultry and rabbits is said to be due to the accommodation afforded by the new premises, where space is sufficient for at least 300 fattening coops. During 1922, 6,234 fowls, 860 ducks, 91 geese, and 1,025 turkeys were disposed of, in addition to large quantities of rabbits, butter, honey and game.

The report states that the Committee were considering the building of further tanks for egg preserving, similar to those built and used at Ipswich during the previous year.

The Committee are open to receive applications for the establishment of agencies in East Anglia.

The Chairman of the Committee stated that the English egg producer would have to keep up the standard of eggs, and that unless this were done, the market for the best eggs would be lost and buyers would purchase foreign eggs.

SOME interesting demonstrations have been conducted in Surrey during the last two years by the Agricultural Education

**Grassland  
Demonstrations  
in Surrey.**

Sub-Committee of the Surrey Agricultural Committee. Although the rainfall in the spring and early summer of 1922 was greater than in 1921 it was not nearly heavy enough, and the ground was still very dry as the result of the exceptionally low rainfall in the preceding year; consequently both years were unfavourable for grassland trials. In spite of these adverse conditions the results from several centres have given information of a definite character and show that considerable improvement in the quality of the herbage in many fields can be brought about on heavy soils by the addition of phosphates only. This improvement is chiefly due in the first instance to the development of the wild white clover.

At Chiddingfold, on strong loam, a dressing of 30 per cent. basic slag ( $5\frac{1}{4}$  cwt. at a cost of £1 18s. 0d. per acre) in February, 1921, gave an increased yield of 8 cwt. of hay both in 1921 and 1922, or 40 per cent. in 1921 and 30 per cent. in 1922, while an equivalent phosphatic dressing of 20 per cent. basic slag gave an increase of 30 per cent. in 1921 and 20 per cent. in 1922. At Newdigate, on a heavy clay, the basic slags greatly stimulated the whole herbage, but there was very little difference between the effect of the 20 per cent. and the 30 per cent. grades.

Generally speaking, on lighter soils small but frequent applications of potash in addition to phosphates are essential. For instance at Brookwood, on a poor thin sandy soil, slag alone gave no increase in the yield of hay. In the first year (1921) of its application the addition of 41 lb. of sulphate of potash to 550 lb. of 20 per cent. basic slag per acre gave an increase of nearly 3 cwt., or 38 per cent. over the unmanured plot, but the effect was not lasting, as in 1922 this plot gave no increase in yield.

At Wootton Park, on a sandy soil on the Lower Greensand formation, a complete manure— $2\frac{1}{2}$  cwt. superphosphate,  $\frac{1}{2}$  cwt. muriate of potash, and  $\frac{3}{4}$  cwt. sulphate of ammonia per acre—doubled the yield of hay (from 15 cwt. to 30 cwt.), improved the quality of the herbage, and also gave much better results than superphosphate alone, superphosphate and potash, or steamed bone flour, potash and sulphate of ammonia.

A report on these demonstrations, which are being carried out at 12 centres, has been issued by the Surrey Agricultural Committee and may be obtained from the Agricultural Organiser

(Mr. J. H. Mattinson, B.Sc.), County Hall Annexe, Kingston-on-Thames.

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An invitation is extended to Farmers' Clubs, Chambers of Agriculture and Horticulture and other bodies interested in agriculture or market gardening, to visit the Rothamsted Experimental fields during the summer. The Guide Demonstrator is Mr. H. V. Garner, B.A., Cambridge, who for the past two summers has very successfully served in this capacity and has been able to make the visits of farmers both useful and interesting.

Among important items of interest are:—Experiments on the manuring of arable crops, especially wheat, barley, mangolds, potatoes; manuring of meadow hay; effect of modern slags and mineral phosphates on grazing land, hay land, and arable crops: crop diseases and pests; demonstrations of good types of tillage implements, tractors, etc. At any convenient time between May and October there is sufficient to occupy a full day, and there is provision for assuring that the time shall not be lost, even if the weather turns out too bad to allow of close investigation of the fields.

The Director of the Station, Sir John Russell, will be happy to arrange full details with organisations of farmers, farm workers and others wishing to accept this invitation. Small groups of farmers are specially welcomed; if possible, arrangements should be made beforehand, but it is recognised that farmers' movements must often depend upon the weather, and no farmer need stay away because he has been unable to write fixing a date.

\* \* \* \* \*

The Ministry invites applications for research scholarships in agricultural and veterinary science. The number to be awarded will depend upon the qualifications of candidates and will not in any case exceed seven. The scholarships are tenable for three years from 1st October, 1923, and are of the value of £200 per annum.

**Agricultural and  
Veterinary  
Research  
Scholarships.**

Applications must be received not later than 15th July, 1923, and must be made on the prescribed form, which together with a copy of the conditions attaching to these scholarships, may be obtained from the Secretary, Ministry of Agriculture and Fisheries, Whitehall Place, London, S.W.1.

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FARMERS should make arrangements in good time for the spraying of weeds. The Ministry's Leaflet No. 68, deals with

**Weed Destruction  
by Spraying.**

the destruction of Charlock, for which sulphate of copper is recommended. For certain other weeds, especially Corn Buttercup (*Ranunculus arvensis*), known also locally as Corn Crowfoot, Starveacre, or Watch-wheels, spraying with a solution of sulphate of ammonia has been found useful. Corn Buttercup, sprayed when just coming into flower with a solution of  $1\frac{1}{2}$  to 2 cwt. of sulphate of ammonia in 50 to 60 gallons of water, applied at the rate of about 50 gallons per acre, has been considerably checked. Other weeds, such as Ivy-leaved Speedwell, Sheep's Sorrel, Charlock and Wild White Mustard have been effectively checked by sulphate of ammonia sprays. Particulars as to this method of dealing with cornfield weeds were given in this *Journal* for March, 1922, and farmers can always obtain advice on the subject from their County Agricultural Organisers. Information as to the use of sprays for the eradication of what is variously known as Thaneet Weed, Chalk Weed, Hoary Cress and Whitlow Pepperwort, appeared in the May issue of the *Journal* (p. 158).

\* \* \* \* \*

THE Fream Memorial Prize is provided annually out of a fund entrusted to the Ministry under the will of the late

**Fream  
Memorial Prize.**

Dr. Fream, who directed that the annual interest should be used for the purchase of books to be presented to the candidate who takes the highest marks in the examination for the National Diploma in Agriculture. This year the highest marks were obtained by Mr. Douglas H. Findlay, a student of Glasgow University and the West of Scotland Agricultural College, and the prize, the value of which is about £7 10s., will be awarded to him in the form of books.

\* \* \* \* \*

THE attention of the Ministry has been called to the fact that some uncertainty exists among cow-keepers, dairymen, and

**Registration  
of Small  
Cow-keepers.**

purveyors of milk as to whether, and how far, the terms of Article 6 (4) of the Dairies, Cowsheds, and Milkshops Order of 1885, are affected by the provisions of the Milk and Dairies (Amendment) Act, 1922, which relate to registration of persons coming under the above categories.

Article 6 (6) of the Order lays down that:—

"A person who sells milk of his own cows in small quantities to his workmen or neighbours, for their accommodation, shall not, for the purposes of registration, be deemed, *by reason only of such selling*, to be a person carrying on the trade of cow-keeper, dairyman or purveyor of milk, and *need not, by reason thereof, be registered.*"

The Ministry is advised by the Ministry of Health that the Milk and Dairies (Amendment) Act, 1922, does not affect the exemption from necessity of registration which is allowed in the cases of persons who come under the terms of the above article.

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THERE are two systems of making Whey Butter, (a) that employed on cheese-making farms; (b) that employed at factories.

#### **The Manufacture of Whey Butter.**

*Cheese-making Farms.*—On cheese-making farms where there is not a sufficiently large quantity of whey to justify the use of a separator, the whey is run into a suitable vessel as soon as it is taken from the cheese, and is allowed to stand for the cream to rise. Whey "leads" are generally used, or sinks made of slate; tin is not to be recommended as the action of the acid in the whey causes it to wear out rapidly; old worn vessels such as copper tubs, etc., result in fermentations which taint the resulting butter. If possible, two vessels or tanks should be provided for raising the cream, so that one can be thoroughly cleansed and sweetened while the other is in use.

The whey should be set somewhere away from the dairy to avoid risk of taints, and the tank should be connected if possible with some means by which the whey can be run off to the piggeries when the cream has been skimmed. The whey should remain undisturbed until next morning, when a thin layer of cream will have risen to the top and may be skimmed off. This cream should be put in a vessel containing a plug hole at the bottom, preferably a glazed earthenware vessel. Four to five times its bulk of boiling water should be added and the whole allowed to remain undisturbed until next morning. The plug may then be removed and the water run off until the cream comes. This water will have clarified the fat and removed the curd and cheesy flavour. The cream should now be poured into a pan or pail that is kept to collect the bulk for churning and a small quantity of "starter," if obtain-

able, be added. The whey should be treated in this manner each day and the bulk of cream obtained should be stirred daily and churned at least once a week. If the cream sours too rapidly, a small quantity of salt should be added. The cream may be churned in the ordinary way but plenty of water should be mixed with it, and the butter also must be well washed with an abundant supply of water when in granules.

*Factories.*—Where a large quantity of whey is available it should be passed through a separator directly it comes from the vat. Some makes of separators have an adjustment to be used for whey, to prevent clogging by the small particles of curd it may contain. The immediate separation of the cream prevents the development of any distinctive cheesy flavour which the cream may acquire when made by the method given above. In addition, all the fat in the whey is recovered. Directly it is obtained the cream should be pasteurised as for ordinary butter-making, and then, if possible, about four times its bulk of good sweet separated milk should be added, and the whole ripened with a good "starter." This cream when treated in the ordinary way will produce a butter of extremely good quality, both as regards flavour and appearance. If pale in colour, butter colouring may be added just before churning. There is no perceptible flavour and it will market for the same value as butter made from ordinary cream.

Under normal conditions whey contains between 0.25 and 0.3 per cent. of fat, but in factories where mixed milks are used, this percentage may rise higher. Thus from every 1,000 gallons of whey from 20 to 30 lb. of butter can be made, according to the fat content of the whey. The yield is therefore worth the additional labour involved in obtaining it.

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**Foot-and-Mouth Disease.**—No outbreak of Foot-and-Mouth disease having occurred since the original outbreak confined on 3rd April at Billochly, near Ayle, all general restrictions imposed in connection therewith were removed on 7th May.

On 23rd April, a fresh centre of the disease was discovered in seven out of ten dairy cows on premises at Plaistow, West Ham. There had been no movements on or off the premises for three months, but a possible origin is suggested by the fact that the owner had used straw which had been utilised for packing glassware imported from Austria, as bedding for the cows. Fortunately there have been no further developments, and all general restrictions imposed in connection with the outbreak were removed as from 22nd May. No outbreak has occurred in any other part of Great Britain since 23rd April.

**Leaflets issued by the Ministry.**—Since the date of the list given on p. 1153 of the March issue of the *Journal*, the following leaflets have been revised.

- No. 26.—Farmers and the Income Tax.
- .. 128.—Advice to Beginners in Bee-Keeping.
- .. 160.—The Cultivation of Lucerne.
- .. 321.—Notes on Essential Points in Poultry Feeding.
- .. 329.—Redemption of Tithe Rent Charge and Corn Rents.

The following Leaflet has been temporarily withdrawn.

- No. 333.—Fish Meal as a Food for Live Stock.

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## REPLIES TO CORRESPONDENTS.

**Argentine Linseed for Sowing.**—H.S. asks whether Argentine Linseed is safe to purchase and sow for a linseed crop, provided the seed has not been heated during transit.

*Reply:* Leaflet No. 278 was sent and attention drawn to the fact that Argentine linseed is there recommended. Argentine linseed, however, which had been imported for crushing purposes, could scarcely be recommended for sowing unless it had first been carefully cleaned of weed seeds.

**Seaweed as Fodder.**—J.R. asks for information as to feeding seaweed stock.

*Reply:* Referred to Professor Hendrick's article in this *Journal*, February, 1916, and to Bruttini "Déchets et Résidus" (International Institute of Agriculture, Rome, 1922). In both of these, information as to edible sorts is given, while Bruttini also refers to several processes of treating seaweeds with a view to the preparation of a feeding stuff. All of these processes involve washing in fresh water and drying, either artificially or in the sun. Specimens of seaweeds can always be named and inquiries as to their utility answered, if addressed to the Director, Royal Botanic Gardens, Kew.

**Pond Mud as Manure.**—K.Q. asks about application of pond mud to the land.

*Reply:* While this material does not usually possess much fertilising value, it will, if it be allowed to dry for a year and then be mixed with lime in the proportion of 1 part of lime to 10 or 20 parts of mud, form a useful compost for application to the lighter classes of arable land. Otherwise, after lying to dry throughout the summer it may be spread without further treatment on grass land. The nature of the mud, however, and the character of the soil to which it is proposed to apply it, are factors which need to be taken into consideration. The County Agricultural Officer will be able to advise, with a knowledge of local conditions.

**Wireworms.**—M.T. asks for information as to chemicals and cultural methods for dealing with wireworms in a badly infested oat field.

*Reply:* The chemicals used so far in attempting to destroy wireworms have given, relatively, such poor effects on small plots that it is hardly worth employing them upon a larger scale. It would seem that many chemicals which under laboratory conditions give entirely successful results, are quite

useless when taken into the field as they break down in the soil before they have had time to kill the wireworms.

The fact that wireworms have already destroyed a crop of winter oats is, not, under any circumstances, particularly hopeful for the spring crop. If, however, oats have to be sown again on this field, the suggestions are that one should sow rather more seed than is customary, give sufficient sulphate of ammonia or nitrate of soda to ensure rapid growth, and keep the soil as firm as possible by rolling. The use of more seed and nitrogenous manures is likely to cause the crop to be "laid" before harvest, but presumably the chance of obtaining a crop would be worth any additional trouble in harvesting. Trials in the North of England showed a very great gain from increasing the amount of seed sown in the case of wireworm-infested fields.

In regard to linseed, there are a certain number of records of this crop being damaged by wireworms, but they are relatively few, and it is considered that it comes next to mustard in its powers of resistance to attack. As a crop it would be far preferable to oats for sowing on a field known to be heavily infested.

**Calcium Carbide Residue.**—M.S. inquires whether expended carbide of calcium will be of use for the destruction of wireworms, and whether it is suitable for the ground or for any useful purpose in an orchard.

*Reply:* No consistent results against wireworms have been obtained from the use of spent calcium carbide. In general this substance can only be regarded as of equivalent value to calcium carbonate as a dressing for the soil. It would therefore be of use in correcting soil acidity but it is not possible to state in advance if it will have any definite insecticidal results.

**Nicotine Insecticide.**—Dr. A. asks for the right mixture for a nicotine aphid insecticide.

*Reply:* The following should be found satisfactory—nicotine (98 per cent.)  $\frac{3}{4}$  of a fluid ounce; soft soap, 1 lb.; water, 10 gallons. If by any chance you are so fortunate as to have a supply of rain water, then the soap may with advantage be reduced to  $\frac{1}{2}$  lb. per 10 gallons. If the wash is required for garden use it is useful to make up a stock solution containing the same quantity of nicotine and soap but one-tenth of the volume of water. This saves a good deal of trouble when only small quantities of wash are required.

Soft soaps vary greatly and it pays to get a really good brand of potassium soap containing about 30-40 per cent. of fatty acids.

## NOTICES OF BOOKS.

**Mites Injurious to Domestic Animals.**—(Stanley Hirst, Asst. Keeper Dept. of Zoology, British Museum, Natural History. London: British Museum, 1922, 170 pp., 3/-.) An illustrated catalogue of parasitic mites (*Acarina*) found on domestic animals. The arrangement is in families, beginning with *Sarcoptes*, or itch mites (the cause of sheep-scab or mange) which occupy more than half the pages of the book. An appendix on the acarine disease of hive bees records Dr. Rennie's recent discovery of the mite causing "Isle of Wight" disease.

**Animal Nutrition.**—(E. T. Hahn, M.A. London: Benn Bros. Ltd., 1923, 52 pp., 2/- net.) The first portion of this brochure deals with the organic chemistry of animal and plant life and their inter-relation as food, and a lucid

description of the stomach and digestive organs of the pig, sheep, cow and horse, and of their respective capacities. An account of experiments to test the assimilation of components of various foodstuffs follows, and, with an explanation of the general economy of the body at various stages of development, leads to a scheme of scientific rationing to ensure efficient nutrition—especially for milch-cows. The brochure is illustrated by charts and diagrams.

**Poultry Keeping on the Farm.**—(Edward Brown, F.L.S. London: Benn Bros., Ltd., 1923, 51 pp., 2/- net.) This gives an analysis of the poultry-carrying capacity of, and breeds suitable for, various types of soil, and discusses the merits and demerits of different methods of maintenance. It further contains suggestions for increasing the production of eggs and poultry, and for combining natural and artificial systems of hatching and rearing, based upon the author's experiments and observations.

**Insect Pests and Fungus Diseases of Farm Crops.**—(A. Roebuck, A.D.A., F.E.S. London: Benn Bros., Ltd., 1923, 55 pp., 2/- net.) This brochure deals with many pests and diseases of plants, and the soil and climatic conditions favourable to their development. The author discusses preventative and remedial methods of combating pests of cereal and root crops. The booklet contains 25 illustrations.

**Farm Costing and Accounts.**—(C. S. Orwin. London: Benn Bros., Ltd., 1923, 31 pp., 1/6.) A frequent cause of financial failure among farmers has been the lack of a check upon the details of expenditure in the various branches of their activities, the possession of which would enable them to recognise at a glance leakages and waste. A simple but effective system of book-keeping would obviate this, and Mr. Orwin's system is well worth studying and adopting by all practical farmers.

**Poultry Craft.**—(Will Hooley, F.Z.S., F.B.S.A. London: The Poultry Press, Ltd., 1923, 473 pp., 15/- net.) This book is intended to collect and impart the technical knowledge, both theoretical and practical, essential to successful handling of large and small flocks of birds, in view of the large increase in late years in the number of poultry keepers of all types. It comprises descriptions of breeds of poultry for household and commercial purposes, their housing, rearing and feeding, their anatomy and physiology, the diseases to which they are subject, and instructions for preparation of poultry for exhibition and the table.

**State Control in War and Peace.**—(Sir Arthur Goldfinch, K.B.E. London: W. H. Smith & Son, 1922, 48 pp., 6d. net.) This is a report of a lecture delivered before the Bradford Textile Society in October last. The lecturer, who acted as Director-General of Raw Materials for the War Office and Ministry of Munitions during the War, effectively exposes many of the uninformed and often self-contradictory criticisms directed against the working of Government control of industries, but proceeds to argue that the success of the measures initiated to meet the situation brought about by the national emergency offers no encouragement for the renewal of such ventures in peace time. Dealing with agricultural depression and low wages, Sir Arthur looks to the development of co-operative methods, in this country as in others, to make farming a self-supporting industry.

**An Economic Survey of a Rural Parish.**—(J. Pryse Howell. London: Oxford University Press, 1923. 31 pp. 1s.) The interest in the study of rural social economics, to which the war gave a welcome stimulus, and which has found practical expression in the movement towards the revival of rural industries, and in the establishment of such organisations as the Village Clubs Association and other centres of social service and rural community work, continues to show evidence of its vitality. This is the more welcome at the present time, when the crisis through which the agricultural industry is passing calls for the completest understanding of all the problems involved. Mr. Howell, of the Institute for Research in Agricultural Economics, Oxford, from which so many valuable studies in agricultural economics have come, has followed a comparatively new line of investigation in this detailed survey of a single parish, which examines such facts as the systems of farming in vogue, the productivity of different sized holdings and the relative amounts of labour employed, the value of farm property, and the nature and cost of farm equipment. As Professor Orwin points out in a prefatory note, the extension of such regional surveys to the country generally would not only throw new light on modern farming conditions, but would provide those who are working to promote rural welfare with the best possible insight into their subject, and would serve to establish the still more valuable element of personal contact.

## ADDITIONS TO LIBRARY.

### Agriculture, General and Miscellaneous.

*Ashby, A. W., and Byles, P. G.*—Rural Education. (227 pp.) Oxford: Clarendon Press, 1923, 2s. 6d. net. [37(42).]

*Thomson, R. B., and Sifton, H. B.*—A Guide to the Poisonous Plants and Weed Seeds of Canada and the Northern United States. (169 pp.) Toronto: University Press, 1922. [63.255.]

*Wittmack, L.*—Landwirtschaftliche Samenkunde. Zweite Auflage. (581 pp.) Berlin: Paul Parey, 1922, 18s. 5s. [63.1951; 63.28(6).]

*Fruwirth, C.*—Handbuch der landwirtschaftlichen Pflanzenzüchtung. Berlin: Paul Parey. [375.4.]

Band I.—Allgemeine Züchtungslehre. Sechste Auflage. (413 pp.) 1922, 12s. 4d.

Band II.—Die Züchtung von Mais, Futterrübe und anderen Klee-Ölpflanzen und Gräsern. Vierte Auflage. (274 pp.) 1922, 7s. 5d.

Band III.—Die Züchtung von Kartoffel, Erbsen, Lein, Hanf, Tabak, Hopfen, Buchweizen, Hülsenfrüchtlern und klebrigen Futterpflanzen. Vierte Auflage. (227 pp.) 1922, 6s. 10d.

Band IV.—Die Züchtung der vier Hauptgetreidearten und der Zuckerrübe. Vierte Auflage. (483 pp.) 1923, 13s. 2d.

*Mackenzie, J. R.*—Brewing and Malting. (143 pp.) London: 1923. 1921, 8s. 6d. net. [663.4.]

### Live Stock.

*Wallace, R., and Watson, J. A. S.*—Farm Live Stock of Great Britain. Fifth Edition Revised and Enlarged. (xx + 868 pp.) Edinburgh and London: Oliver & Boyd, 1923, 30s. net. [63.6(42).]

*Wisconsin Agricultural Experiment Station.*—Bull. 350.—Minerals for Live Stock. (21 pp.) Madison, 1923. [612.394.]

### Dairying.

*National Farmers' Union.*—Methods of Milk Production and Distribution in the United States and Canada. Report of an Inquiry made by Mr. E. W. Langford. (24 pp.) London: National Farmers' Union, 1922, 3d. [63.7(71); 63.7(73).]

*U.S. Department of Agriculture.*—Bull. 1144.—Cost of Milk Production on 48 Wisconsin Farms. (22 pp.) Washington, 1923. [63.7(73); 63.714.]

**Natural History, Poultry and Bees.**

- Tatten, H. M.*—The Badger Afield and Underground. (159 pp.) London: Witherby, 1923, 8s. 6d. net. [59.9.]
- "*Sonimor*."—Egg-in-Kums (Incomes from Eggs): How to Make Them. (120 pp.) H. M. Morison, "Sonimor" Egg Farm, Leckhampstead, Newbury, Berks, 1923, 5s. [63.651.]
- Taylor, E. H., Ltd.*—Bees for Beginners. (129 pp.) Welwyn: E. H. Taylor, Ltd., 1923, 2s. 6d. [63.81.]
- Starges, A. M.*—The Rational System of Bee-Keeping for the Prevention of Disease and Avoidance of Swarming. (60 pp.) The Author, "Shenstone," Hartford, Cheshire, 1923, 1s. net. [63.81.]

**Engineering.**

- Foster, W. A., and Carter, D. G.*—Farm Buildings. (377 pp.) New York: John Wiley; London: Chapman & Hall, 1922, 16s. net. [60(62).]
- Putnam, X. W.*—The Petrol Engine on the Farm, including Construction, Repair and Management. (xxxi + 327 pp.) London: Page & Co., 1921, 16s. [63.17.]

**U.S. Department of Agriculture.—**

- Farmers' Bull. 1295:—What Tractors and Horses Do on Corn-Belt Farms. (13 pp.)
- Farmers' Bull. 1296:—Changes Effected by Tractors on Corn-Belt Farms. (11 pp.)
- Farmers' Bull. 1297:—Cost of Using Tractors on Corn-Belt Farms. (14 pp.)
- Farmers' Bull. 1298:—Cost of Using Horses on Corn-Belt Farms. (15 pp.)
- Farmers' Bull. 1299:—Shall I Buy a Tractor? (9 pp.)
- Farmers' Bull. 1300:—Choosing a Tractor. (12 pp.)
- Washington, 1923. [63.175; 63.19.]

[This series of six bulletins has been prepared under the direction of a departmental committee of the U.S. Department of Agriculture in a study of all phases of the farm power problem. The relative adaptability and reliability of tractors and horses to work on corn-belt farms under both favourable and unfavourable conditions are discussed with a view to determining the form of power most satisfactory for specific farm operations. The results obtained by the employment of the different types of tractors on farms of various sizes; the work which can be done by the tractor; the saving of labour which can be effected by the use of a tractor; the costs of operating and repairing tractors, keeping and feeding horses, and the cost of power furnished by each, are carefully set out. These enable the man who is contemplating the purchase of a machine to determine approximately what influence the tractor may have on his farm, and the man who already owns one to compare his results with those obtained by others.]

**Economics.**

- "The Times" *Agricultural Correspondent*—The Future of Agriculture: Tour of Rural England. A series of articles reprinted from "The Times," October–December, 1922. London: "The Times" Office, 1923, 6d. [338.1.]
- Manchester Guardian Commercial*.—European Reconstruction. Section 11:—Food Supplies. (pp. 811-840.) Manchester, 1923. [338.1; 338.9.]
- Knight, Frank & Rutley*.—The Land Question II. (24 pp.) London: Knight, Frank & Rutley, 1923. [338.1; 333.5.]



## SELECTED CONTENTS OF PERIODICALS.

### Agriculture, General and Miscellaneous.

- Modern Seed Testing. The New Zealand Official Seed Station, N. R. Ferguson. (N. Z. Jour. Agr., Feb., 1923, pp. 63-72.) [63.195.1.]
- The Value of Mineralogical Examination in Determining Soil Types, with a Method of Examination and a comparison of certain English and Scottish Soils, J. Hendrick and G. Newlands. (Jour. Agr. Sci., Jan., 1923, pp. 1-17.) [63.111; 63.113.]
- The Determination of the Number of Bacteria in the Soil, C. L. Whitlatch. (Jour. Agr. Sci., Jan., 1923, pp. 18-48.) [63.115.]
- Life History of Azotobacter, F. Löhnis and N. R. Smith. (Jour. Agr. Res., 10th Feb., 1923, pp. 401-432 and 9 plates.) [576.8.]
- The Development of Agricultural Education in England and Wales, Sir A. D. Hall. (Jour. Roy. Agr. Soc. England, vol. 83 (1922), pp. 15-34.) [37(42).]
- Agricultural Education and Research in Scotland, Part II.—The West of Scotland Agricultural College, A. McCallum. (Scottish Jour. Agr., Apr., 1923, pp. 149-162.) [37(41).]

### Field Crops.

- Experiments in the Manuring of Beans and Red Clover, A. W. Oldenshaw. (Jour. Roy. Agr. Soc. England, vol. 83 (1922), pp. 97-103.) [63.32; 63.33-16.]
- Wheat Breeding Experiments, R. H. Diffen. (Jour. Roy. Agr. Soc. England, vol. 83 (1922), pp. 35-44.) [63.311.]

### Live Stock.

- Censuses of Pedigree Stock in Scotland in 1920 and 1921. (Scottish Jour. Agr., Apr., 1923, pp. 208-219.) [63.4(41).]
- Importance of the Pig Industry, J. E. Smith. (Jour. Kent Farmers' Union, Apr., 1923, pp. 142-148.) [63.64.]
- Inheritance in Swine, E. N. Wentworth and J. L. Lush. (Jour. Agr. Res., 17th Feb., 1923, pp. 557-582.) [575.1; 63.64.]
- Wensleydale Sheep, H. G. Robinson. (Jour. Roy. Agr. Soc. England, vol. 83 (1922), pp. 97-109.) [63.631.]

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